

# MACHINE TOOL BLUE BOOK

NOVEMBER 1942

**DoAll** *CUTS MAN HOURS* **500%**



Don't worry about your shape cutting jobs —  $\frac{1}{2}$ " thick armor plate, metal blocks a foot thick, tubing or flats or sheet metal, special replacement parts for machines — the DoAll gives a precision finish that will amaze you because (a) the speed with which it is done saves valuable man hours, machine time and power, (b) no further machining is required.

The DoAll is a MUST in every tool and die room, also a lar First Aider on production lines — easily moved to any of a plant to to relieve \$5,000 to \$40,000 machine tools of load work.

**THE BOOK** — "DoAll on Production" a pictorial story of DoAll at work in many plants. Send for copy.

At first DoAll, drive shafts for wobble pumps are filed in 30 min. each. Formerly they required 3 hours hand filing. The other DoAlls are sawing out patterns, filing key ways for gun mounts and machining 6" thick die blocks. Bins are filled with DoAll production jobs.

**THE DOALL USES  
3 KINDS OF BANDS**

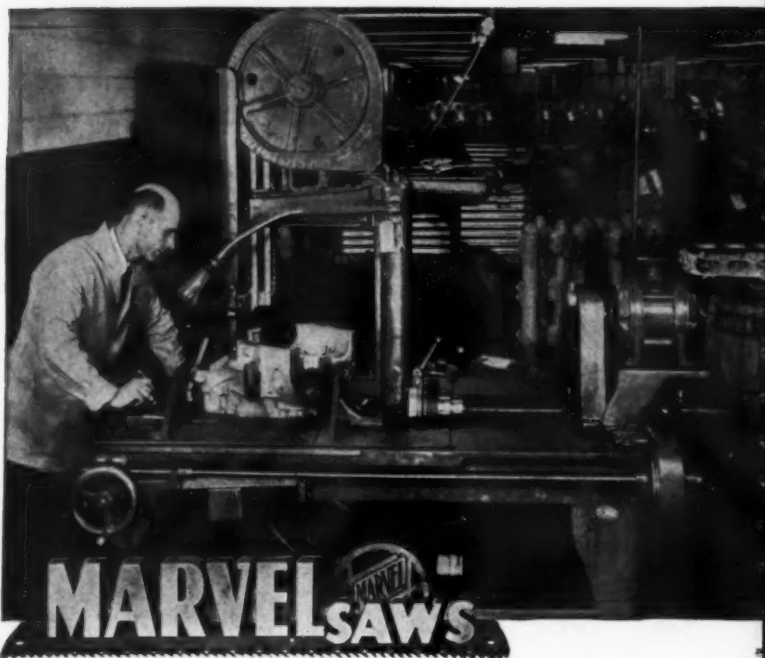


ASK FOR  
REGISTRATION

**CONTINENTAL MACHINES, INC.**

1300 S. Washington Ave., Minneapolis, Minn.

Associated with the DoAll Co., Des Plaines, Ill., Manufacturers



Photograph Courtesy Packard Motor Car Co.

## A MARVEL No. 8 Speeds All-out Production of Packard Rolls-Royce Aircraft Engines

MARVEL Sawing Machines are playing an important part in speeding production for National Defense. Not only the MARVEL 6A and 9A High-Speed Production Saws that automatically cut-off rifle barrels, gears and parts from bar stock in great quantities; or the giant MARVEL No. 18 Hydraulic Saw so well known for its cutting Speed; but all other MARVEL Saws, too, each in its own way, are at work in America's "all-out production." Take for example, the MARVEL No. 8 Universal Band Saw illustrated above, working on aircraft engine crankcases in the "D" Division of the new Packard Rolls-Royce Engine Plant.

Because of its large capacity (will handle work up to 18"x18"); because it cuts at any angle from 45° right to 45° left; and because the blade remains vertical throughout its straight-forward carriage travel, the MARVEL No. 8 will do trimming, notching, mitering and cutting-off, and will save hours of machining by roughing out work to size and shape.

### ARMSTRONG-BLUM MFG. CO.

*"The Hack Saw People"*

5700 Bloomingdale Ave.

Chicago, U. S. A.

Eastern Sales Offices: 225 Lafayette St., New York



# HOBART "Simplified" ARC WELDER

advantage... today's  
vital war



## SAVE 7% ON ROD BILLS!

Here's How...

7% is pretty good interest! Yet some users of Hobart Arc Welding Electrodes say the saving would be computed at 14% to 21%!

Hobart Arc Welding Electrodes have the correct "shielding" and are uniformly concentric. The operator can "burn 'em down" to the last precious fraction of an inch!

Write for information.

**HOBART**

Electrodes  
for every type  
welding job.

Wartime service in shipyards, tank arsenals, aircraft factories and other vital industries is proving that Hobart Arc Welders are "built to take it!"

Hobart's expanded production facilities are turning out practically fifteen times the normal volume—yet the service department hardly notices the change.

Hobart Welders of today's "vintage"—and of fifteen years ago—are on the job! 24 hours a day! 7 days a week! Trouble-free service.

Priorities and allocations limit the number of users we can supply now—but the wartime service record of Hobart Welders means THOUSANDS of enthusiastic Hobart Users after the war!

## HOBART "Simplified" Arc Welders

HOBART BROS. CO., BOX TB-112, TROY, O.  
Enclosed find \$\_\_\_\_\_ for \_\_\_\_\_ copies of  
your new 1942 ARC WELDING MANUAL.

NAME \_\_\_\_\_

POSITION \_\_\_\_\_

ADDRESS \_\_\_\_\_

Have You ordered your copy of this valuable Arc Welding Book? — 516 Pages.

\$2.00

one of the World's Largest Builders of Electric Arc Welders and Equipment.

# RIVETT 715



## *All in a Name:*

"RIVETT" stands for 53 years experience in the building of precision bench lathes. "715" stands for a sensitive high speed, light duty, precision bench lathe having 7" swing and 15" center distance. The spindle runs in true dynamic balance at selective speeds from 100 to 3500 r.p.m. and takes draw-in collets up to  $\frac{3}{4}$ " diameter capacity. For further information on this and other Rivett bench lathes write today.

**RIVETT**  
PIONEERS IN BENCH

**LATHE & GRINDER INC.**  
BRIGHTON, BOSTON, MASS.  
LATHE DEVELOPMENT

# "Performance has established leadership for HARDINGE High Speed Precision Machines"

HARDINGE High Speed Precision Machines with preloaded ball bearing spindle construction are *fast, accurate and dependable*. This combination, together with the ease and simplicity of operation, enables relatively unskilled operators to rapidly produce parts to the necessary close limits without expensive tooling.



HARDINGE  
HIGH SPEED  
PRECISION LATHE



HARDINGE  
HIGH SPEED PRECISION  
SECOND OPERATION MACHINE



HARDINGE  
HIGH SPEED PRECISION  
TOOL-ROOM LATHE



HARDINGE  
HIGH SPEED PRECISION  
MILLING MACHINE





**for high efficiency  
in the production of:**

ARMSTRONG TOOL HOLDERS  
 ARMSTRONG Turret Lathe and Screw Machine  
 Tools  
 ARMSTRONG LATHE DOGS  
 ARMSTRONG Drop Forged WRENCHES  
 ARMSTRONG Socket Wrenches  
 ARMSTRONG "C" CLAMPS  
 ARMSTRONG HIGH SPEED STEEL  
 ARMSTRONG RATCHET DRILLS  
 ARMSTRONG SETTING-UP TOOLS  
 ARMSTRONG Machine Shop Specialties  
 "ARMSTRONG BROS." PIPE TOOLS

**—all vital tools of modern warfare.**



**ARMSTRONG BROS. TOOL COMPANY**

**"The Tool Holder People"**

**CHICAGO**

**U. S. A.**

# Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St. Chicago

35,700 This Issue

Volume 38, No. 11

NOVEMBER 1942

Featured in This Issue.....	67
Editor's Page.....	69
Women in Production Work.....	71
By Wendell E. Whipp.....	
Chip Breaker Designs.....	89
By W. L. Kennicott.....	
The Art of Doweling.....	101
By H. F. Williams.....	
Testing New Tool Operators.....	117
Models Speed War Production.....	127
By H. E. Chesebro.....	
The Foremanship Forum.....	137
(Part 3).....	
By Edmund Mottershead.....	
Aspects of Modern Milling..... (Part 4).....	161
By John E. Hyler.....	
Aptitude Testing.....	173
By M. G. Heuer.....	
Positioners Speed Welding.....	185
By Carleton Cleveland.....	
Harvesting the Scrap.....	199
By Paul C. Cabot.....	
Surface Broaching "Con" Rods.....	209
The Temp-A-Trol Welding Process.....	213
Spot Air Conditioning.....	216
By L. W. Clifford.....	
"Let's Talk Shop".....	219
"Tooling Up" for Victory.....	258
Plants for SubContract Work.....	354
Mechanics Through the Ages.....	380
Latest Equipment Catalogs.....	377-378
Index to Advertisers.....	382-386



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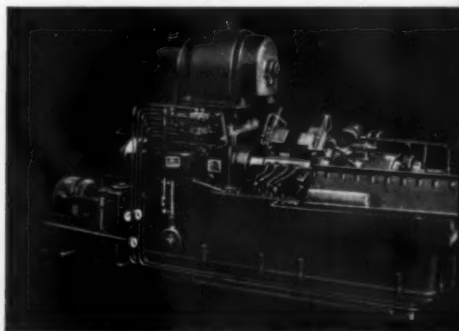
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# "PLEASE POST THIS IN"



## "The Lamson Catalog of 1865"

NEITHER Jones & Lamson nor its early predecessors has ever been backward about keeping industry informed of the newest developments in their machine tool line. When American missionaries were first bringing the Bible to heathen lands, Vermont machine tool men afoot, on horseback, flatboat and stagecoach were tooling infant industries on the frontiers of America. Sometimes these hardy salesmen ran out of cash on the road. One of them labored for weeks as a bartender in a hotel to earn money to travel on. Today Jones & Lamson representatives travel by auto, rail and air, but they are no less eager than their predecessors to bring you information of new ways to speed production.



Jones & Lamson 16' Fay Automatic Lathe tooled to machine a shell.



AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS



RAM TYPE UNIVERSAL TURRET LATHE



# A CONSPICUOUS PLACE"

THE machines shown in this catalog are no longer made. But there is one item worth remembering that can help you meet today's emergency and safeguard future earnings in postwar competition.

Now, as in 1865, Jones & Lamson equipment offers advances in machine design and precision workmanship that enable you to take every possible advantage of available cutting tools.

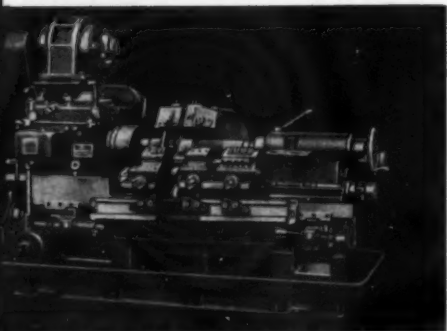
Specifically, Jones & Lamson Turret Lathes, Fay Automatic Lathes and Automatic Thread Grinding Machines embody

numerous refinements that make for rapid, effortless low-cost operation. Into them are built excess reserves of speed, rigidity and useful power that permit maximum employment of any hard alloy tool or high speed grinding wheel now made, or likely to be made in the near future.

Detailed information of these features is available in the newest illustrated Jones & Lamson catalogs. Inquiries from large plants or small receive careful study here. It pays to put production problems up to Jones & Lamson engineers.

## JONES & LAMSON

MACHINE COMPANY • Springfield, Vermont, U.S.A.



Jones & Lamson 16' Fay Automatic Lathe tooled to machine a rear axle housing.

*Manufacturers of Ram & Saddle Type  
Universal Turret Lathes . . . Fay Auto-  
matic Lathes . . . Automatic Thread  
Grinding Machines . . . Comparators  
. . . Automatic Opening Threading  
Dies and Chasers*



PROFIT PRODUCING  
MACHINE TOOLS

SADDLE TYPE  
UNIVERSAL TURRET LATHE



FAY AUTOMATIC LATHE



AUTOMATIC OPENING  
DIE HEAD

*For Users of Machine Tools*



● This booklet on lubrication publication No. M-1084, was prepared especially for users of CINCINNATI Milling, Grinding, Broaching, Lapping and Cutter Sharpening Machines. Other shop men interested in correct lubrication are welcome to write for a copy of 1





# TAPS FOR VICTORY

The Winter Brothers Company are utilizing every man and machine to produce quality taps in ever increasing volume, without sacrificing that vital factor—**ACCURACY.**

Every effort is being put forth to see that you get the taps to meet your threading needs—Quality Taps, that enable you to do your share with greater efficiency.

Please follow closely priority regulations to facilitate prompt handling of your orders.

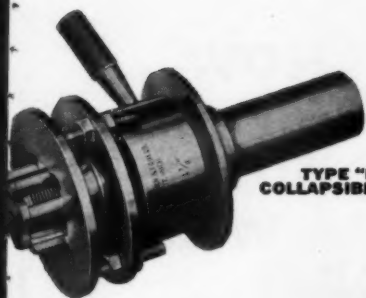
A DIVISION OF  
**THE NATIONAL TWIST DRILL  
AND TOOL COMPANY**  
DETROIT, MICHIGAN



# Winter Brothers

COMPANY  
Wrentham, Massachusetts, U. S. A.  
Branch Factory, Detroit, Michigan





**TYPE "M"  
COLLAPSIBLE TAP**

**TYPE "G" SELF-  
OPENING DIE HEAD**



## DIES & TAPS

Whatever your production schedules may be, Murchey has a complete line of self-opening dies and collapsible taps designed to produce ordnancetolerances on a production basis.



## THREAD MILLING MACHINES

Whether it's a question of size, tolerance, or production, Murchey Thread Milling Machines cover a wide range in cutting external or internal threads.

The use of full-length annular milling cutters with accurate control of pitch and depth produces precision-cut threads at a production rate which will interest you.

**WRITE FOR DETAILS OF THESE  
AND OTHER MURCHEY MACHINES.**

**MURCHEY MACHINE AND TOOL CO.**



## NOW... for your ALUMINUM WELDING

**P**ROGRESSIVE offers a complete line of pedestal, rocker arm, and gun type welders specifically designed for spot welding of aluminum . . . Controlled by the new "Revers-O-Charge" Condenser discharge unit . . . With refrigerated electrodes for higher production, longer tip life, and weld consistency.

*For Faster Delivery Specify "Progressive"*

Write for Bulletin No. 101-H

## PROGRESSIVE WELDER CO.

SEAM, PROJECTION & BUTT . . . Electric Welding Equipment . . . PORTABLE GUN & PEDESTAL

3050 E. OUTER DRIVE

DETROIT, U.S.A.

ROUND 9

# BOUT of the O'TOOLS

10 ROUNDS—AIR VS. HIGH-CYCLE GRINDERS



"SO I LANDED ME POWER PUNCH  
..SAVED 225 H.P."

**Now ready:** Wall charts with all the maintenance pointers on portable tools ... AIR or HIGH-CYCLE. Free on request. Specify which type of tools you use.



• This new steel mill called in the Rotor Analyst for an unbiased recommendation for grinders. Should it be AIR or HIGH-CYCLE? Each has its place—depends on the individual plant situation.

So they sounded the gong for Round 9, Bout of the O'Tools. Both AIR and HIGH-CYCLE were evenly matched on production punch. But HIGH-CYCLE won on power punch: Lower first cost—saved over \$7,100 in cost of power units. Lower power cost—saved 225 B.H.P. which, on full load operation at 1¢ per K.W.H., saves over \$3,000 per shift yearly—a substantial contribution to the war effort.

Why not be sure you get peak production from portable tools at rock-bottom cost? Call in the experienced, unbiased Rotor Analyst for all problems in the selection and maintenance of portable tools.

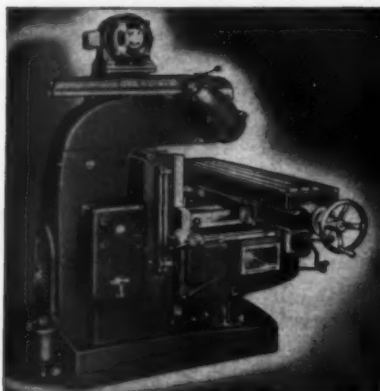
THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOLS

HIGH  
CYCLE

# Tools of Peace are now WEAPONS OF WAR



NO. 36 RAM-TYPE MILLER

Table: 50" x 12"

Range: 38" longitudinal, 12" cross, 18" vertical



NO. 3-S HORIZONTAL MILLER

Plain and Universal

Table: 50" x 12"

THE VAN NORMAN LINE OF MILLING MACHINES needed no redesign for wartime operations . . . and they have required no radical changes since. For more than 50 years of development had given these precision tools the highest adaptability to the most exacting requirements for speed and accuracy that could be imposed either in peace or war. Today, Van Norman Vertical, Horizontal, Ram-Type, Contour and Hand

Millers are helping to keep vital war work up to . . . and in many cases, ahead of . . . schedules in key production plants of all the United Nations. They are making it possible to turn out quality work in unprecedented quantity because of their extreme ease of operation and control, which not only saves time for skilled operators, but also helps new operators to learn their jobs more quickly.

VAN NORMAN MACHINE TOOL CO., SPRINGFIELD, MASS.

## **Van Norman** MILLING MACHINES

In June, 1942, Van Norman was awarded the Army and



Navy E in recognition of its war production record.

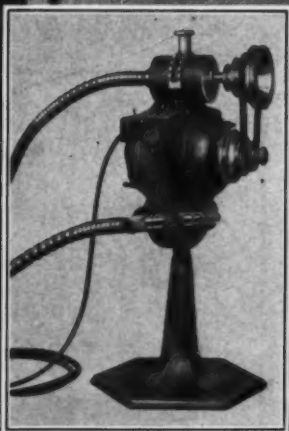


# Jarvis POWER TOOLS

## READY FOR ACTION

Jarvis Power Tools as used in the manufacture of engines, propellers, planes, ship and instruments have done their part.

OFFICIAL U. S. NAVY PHOTOGRAPH



THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES

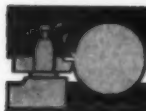
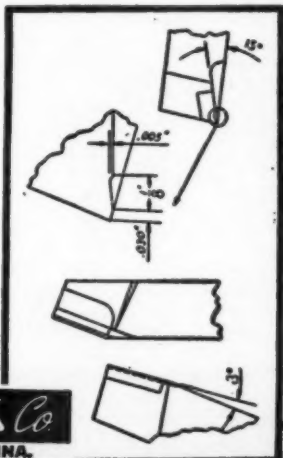


*Tom the foreman says:*  
**"IT TAKES GOOD CARBIDE TO DO THIS!"**

"Every shop man knows that you can shear off steel chips with less power if your tool has a good side rake. We found Kennametal is strong enough to use 15° side rake on turning tools for tough steel provided we use a negative back rake and a 'flat' on the cutting edge about as wide as the feed. We grind a chip breaker groove  $\frac{1}{16}$ " wide and about .005" deep along the cutting edge, using only a diamond wheel and taking off only  $\frac{1}{2}$  of a thousandth per pass. We put a 'flat or land' along the edge about .030" wide or a little less than the feed.

"We tested these tools against tools ground the same way with the usual 6° side rake. Sparks, our electrician, was growling about 'overloaded motors' so we had him hook in his ammeter on the turret lathe where we happened to be turning forgings of SAE 3140. We were running 165 R.P.M. on a 7½" diameter, turning flanges with .042" feed. The old ammeter went up to 60 amps with the 6° side rake tool while the high point was only 45 amps using the 15° side rake. Sparks didn't need to tell me it was taking less power. I knew because I saw the straw colored chips coming off easy with the new tool when they had been blue with the 6° side rake tool. Jim, the operator on the turret lathe says, 'Now we're going places', and he proved it, too. As he had to change tools less often and had no blow outs he turned out 10% more work every day last week and we all thought we were doing mighty well before!"

And then Tom says, "look at these chips off the big boring mill where we used 15° side rake with 8° negative back rake on 45 steel forgings taking a healthy cut of about  $\frac{1}{8}$ " deep. I tell you, it took the groan out of those old boring mill gears!"



**McKENNA METALS Co.**

**135 LLOYD AVE., LATROBE, PENNA.**

Divisions of THE STEEL EXPORT CO., INC., PITTSBURGH, PENNSYLVANIA  
 Sole Importers of Canada and Great Britain



# TEAM WORK

*gets things done*

—and Team Work  
is what you'll find throughout  
the KIRK & BLUM Organization



## WELDED MACHINE BASES, PEDESTALS FRAMES and LATHE PANS

Engineers and skilled mechanics, working as a unit, produce sheet steel and light plate products that meet your special designs and requirements—Welded Machine Bases, Pedestals, Frames and Lathe Pans all formed and welded with craftsman-like skill.

You immediately increase your capacity for greater production when Kirk & Blum fabricates your products. You save time, and reduce costs. From receipt of blue prints to completed products, team work, throughout our organization gets the job done.

*Send for our booklet:*

*"Data on Kirk & Blum Production Facilities." It is illustrated with many products we have made for various industries and shows a list of our equipment.*

**THE KIRK & BLUM MANUFACTURING CO.**

2834 SPRING GROVE AVE CINCINNATI, OHIO

**An Organization of Engineers and Mechanics**



# Heat Treat

Your Own Small Parts...

## SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

- 1 Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
- 2 Saves time and expense of drawing or tempering small metal parts in large furnaces.
- 3 Cuts handling time when normalizing or annealing small parts. No waiting.
- 4 Conveniently available for pre-heating for subsequent high-speed hardening.
- 5 Eliminates shut downs and delays in servicing emergency repair orders.

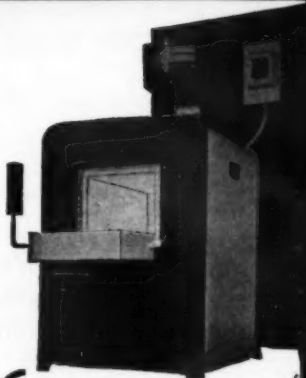
### AVAILABLE IN TWO SIZES

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14"L	29.6	3400	14.8	\$124.00*
MH-4	10"W 6"H 18"L	...	4800	20.9	\$191.00*

\*Includes Hearth Plate

**MAX. SAFE TEMPERATURE**—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

**AUTOMATIC CONTROL**—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—\$142.40.



**REPLACEABLE HEATING ELEMENTS**—Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

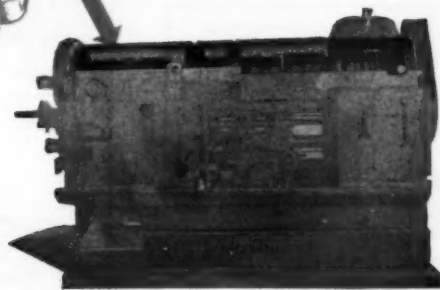
**FREE** Complete data covering specifications, additional applications and ordering instructions are included in this new folder. Write for your copy today. Ask for Bulletin No. 50.



**COOLEY ELECTRIC MANUFACTURING CORP.**  
213 S. SENATE AVENUE INDIANAPOLIS, IND.



YOU COULD FIND THEM  
IN A BLACKOUT



### CONE CAMS ARE SO ACCESSIBLE

There is no question about the accessibility of Cone Cams. They are all on cam drums on one Camshaft, which runs the full length of the machine — in the rugged top bed, above the work area, free from falling chips and protected from dirt and foreign material.

As this feature places Cone Cams always within easy reach of the operator, it facilitates quick changeover. The clear visual picture of the cams in actual operation assists the new operator to more quickly know his machine.

The Cone Over-Head Camshaft is but one of the advantages identifying Cone Departmental Design, and, from the time of its inception, has marked a step forward in multiple spindle automatic construction.

If your production-pulse needs priming it will pay you to specify Cones.



# CONE

AUTOMATIC MACHINE CO., INC.

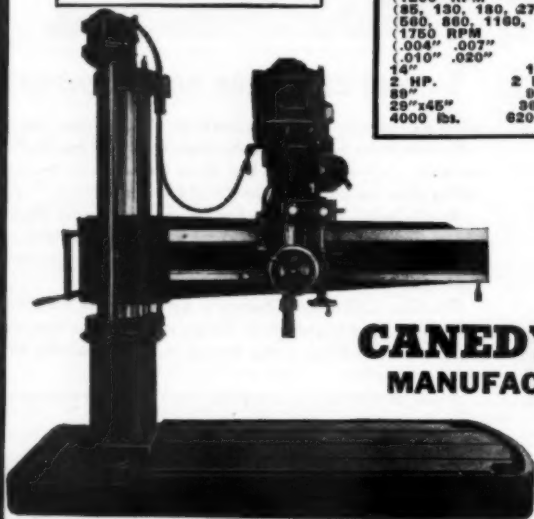
Windsor, Vermont U.S.A.

# CANEDY-OTTO RADIAL DRILLS

Canedy-Otto has been the manufacturer of first-class, high-grade drilling units since 1892. These units are available in single spindle, multiple spindle and radial.

We can help you solve your drilling problems. Send for information on our complete line.

**USED  
THE  
WORLD  
OVER**



## SPECIFICATIONS:

Drills to the center of circle on base or table  
Length of arm  
Greatest distance from spindle to base  
Minimum distance from spindle to base  
Minimum distance from spindle to column  
Traverse of spindle  
Hole in spindle—Morse Taper  
Diameter of spindle at nose  
Traverse of head on arm  
Traverse of arm on column  
Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column  
Size of main driving motor  
Height of drill column over gears  
Working Surface of Base  
Net weight

9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
73 1/2"	98"	120"
3"	4"	5"
43 1/2"	48"	48"
9 1/2"	15"	17"
10 1/2"	10"	10"
9 1/2"	5 1/2"	5 1/2"
No. 4	No. 4	No. 4
2 1/2"	2 1/2"	2 1/2"
25 1/2"	38 1/2"	48 1/2"
21 1/2"	24"	22"
(60, 85, 130, 180, 425, 560, 860, 1200 RPM		on all models
(85, 130, 180, 274, 560, 860, 1180, 1750 RPM		on all models
(.004" .007" .010" .020"		on all models
14"	16"	18"
2 HP.	2 HP.	2 HP.
89"	98"	98"
29"x45"	36"x60"	36"x83"
4000 lbs.	6200 lbs.	7000 lbs.

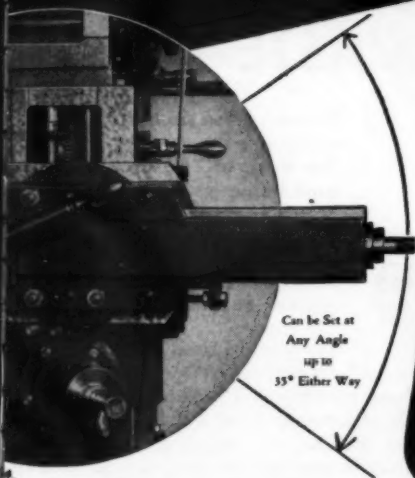
**EARLY  
DELIVERY  
POSSIBLE**

**CANEDY-OTTO  
MANUFACTURING CO.**

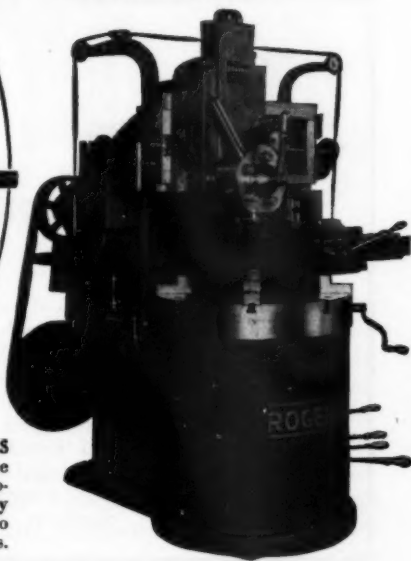
**CHICAGO  
HEIGHTS,  
ILLINOIS**

# HOW ROGERS *Specially Designed* SWIVEL SIDE HEAD WILL STEP UP YOUR WAR PRODUCTION

when BORING, DRILLING,  
TURNING ferrous and  
non-ferrous pieces



Can be Set at  
Any Angle  
up to  
35° Either Way



• ROGERS "Perfect 36" VERTICAL TURRET MILLS universal adaptability is further increased by the Rogers Swivel Side Head. This new development permits the side head to be set at **any angle** each side of horizontal up to 35 degrees to facilitate tool setting for irregular shaped pieces.

This swivel side head combined with lever chuck are a couple of the many reasons operators make **quicker set-ups**... more finished work... and **closer tolerances** in a minimum amount of operator's time and equal reduction of "down time".

Call on Rogers today and tomorrow to "Machine It on the Level."

**Rogers Are Making Surprisingly Quick  
Deliveries at Attractive Prices**

**Knowing How Since 1885**

**FEATURES**—36" diameter capacity... 5-sided main turret and 4-sided side turret... side head sets at any angle up to 35 degrees each side of horizontal... rapid traverse on main head... box type main and side head rail with saddle, swivel and tool stake... 6 1/2" diameter spindle with 175 sq. in. V-shaped bearing 1 1/2" in diameter... foot operated controls...

**ROGERS  
MACHINE WORKS INC.**

FACTORY: ALFRED, N. Y.

SALES OFFICES: 129 ARTHUR ST., BUFFALO, N. Y.

# ZERO HOUR

## THIS IS NO TIME TO WASTE TIME



R and L—the *time saving* turning tool is the answer. It will do the work of 14 different tools now being used in your shop.

It can be changed from right to left or left to right in 10 seconds. The only tool on the market of its kind.

No wasted time in set-up; performs many operations at once, such as: turning shoulder concentric with stock diameter; turning two diameters while drilling or reaming; turning one diameter-chamfering two corners, facing end of part along with drilling or reaming; turning and forming special shape or end of part, while drilling or reaming; drilling and chamfering; pointing work concentric with turned diameter. *Write for detailed information.*

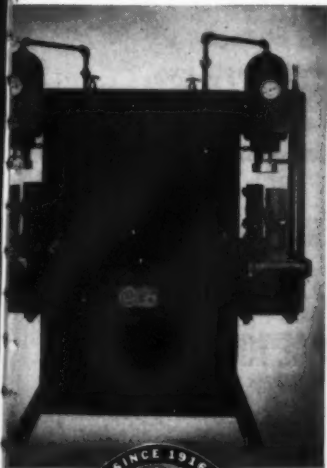
## R AND L TOOLS

1827 BRISTOL ST., NICETOWN, PHILADELPHIA, PA.

# KRW HYDRAULIC ARBOR PRESSES

*for War  
Production*

Standard Hydraulic Presses  
25, 50 and 75 ton capacities. Special Presses engineered for specific war production needs.



The exclusive design features which have given KRW Standard Presses their reputation for speed and efficiency are available to war production manufacturers who require presses of special design. The illustration above shows a *special*, extra high 75 ton KRW Press in comparison with the Standard 25 ton unit. Opposite illustration shows a special, 4-man operated, air-oil Press used for bomb loading.

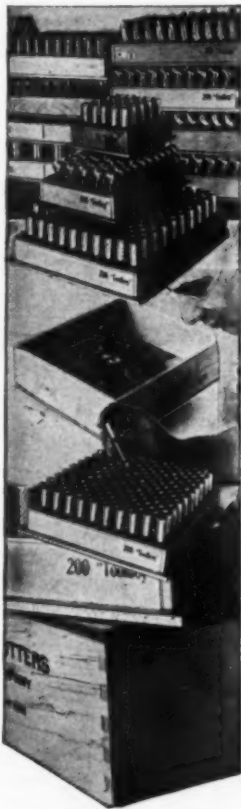
... KRW also builds bench-type Arbor Presses in  $\frac{1}{2}$ , 1 and 3 ton capacities.



## K. R. WILSON

10 LOCK ST. BUFFALO N. Y.

# Announcing Our "Toolboy"



A Portable Toolcrib for Holding and Shipping Midget Milling Cutters Combining these Unique Features.

- ★ **3 Convenient Sizes**
- ★ **No Loss in Transit**
- ★ **Prevents Dulling**
- ★ **Easy to Handle**
- ★ **No Unwrapping**
- ★ **Easy Inventory**
- ★ **Capacity of Each**
- ★ **Lid is Receptacle for Dull Cutters**
- ★ **Strong Construction**
- ★ **Use Little Storage Space**
- ★ **No Cut Fingers**
- ★ **Full Credit Allowed When Returned.**

(Customer invoiced \$ .75, \$1.00, or \$1.50 according to size.)

**SEVERANCE TOOL COMPANY**  
SAGINAW, MICHIGAN

**BRANCHES**

Long Island City, N. Y.    Los Angeles, Calif.  
Detroit, Mich.



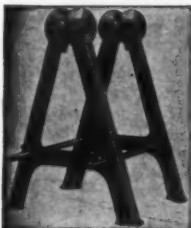
# Sundstrand Balancing Tools



**No. 5 Extra Heavy Duty**



**Sundstrand Supersensitive Balancing Tool**



**No. 2 Floor Type, Portable**

## Use These Accurate Tools To Speed Your Balancing and Truing Operations

Speed output and save valuable man-hours on balancing, straightening or truing operations . . . use Sundstrand Balancing Tools to handle your volume and variety of work efficiently. Accurate, sensitive, durable; they provide economical means for checking balance of gears, shafts, pulleys, and similar parts.

Supersensitive Bench Type shown above is smallest; indicates out-of-balance small as 5 grains on 3" radius of a 1½ lb. work-piece. Others include Portable Balancing Tools up to 10,000 lbs. capacity, and No. 5 Heavy Duty with 24,000 lbs. capacity. Check shop requirements now and order needed sizes.

**DEALERS**—Sundstrand Open Line comprises Index Bases, Balancing Tools and Bench Centers; offers excellent quality, value and sales opportunities. Investigate.



**Write, Today,  
For Bulletin  
SBT-436**

**Ask For  
Name of  
Nearest  
Dealer**

**Sundstrand Machine Tool Co.**

8535 Eleventh Street, Rockford, Illinois, U. S. A.

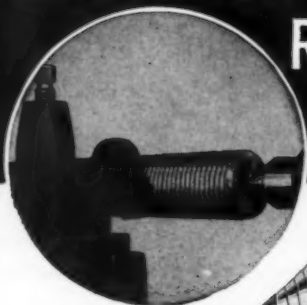
**RIGIDMILS • STUB LATHES**

Drilling and Centering Machines • Hydraulic Operating Equipment



# 1500% LONGER RUNNING TIME

BEFORE CENTER POINT  
NEEDS ATTENTION



## Helical Groove CENTERS

When Used With  
CMD CENTER POINT  
LUBRICANT

has an operating ratio of from 15 to 1  
running time over the conventional type  
of lathe center.

● **A BETTER CENTER:** The grooves hold an ample supply of lubricant for replenishing the lubricant that is dissipated because of heat from work expansion between centers and heat generated by cutting tools...No adjustment of tail stock is necessary to relubricate.

Because the grooves are left-hand (in the same direction as the turn of work) they prevent dripping and force lubricant to extreme point of center assuring proper lubrication of entire bearing surface...No production delays to replace galled or burned-out centers!

● **A BETTER LUBRICANT:** CMD Center Point oil withstands pressures greater than 50,000 lbs. per square inch. Lathes centers can be drawn up tight against work permitting finer tolerance and higher precision results.

**Write for FREE Sample Kit**

### CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

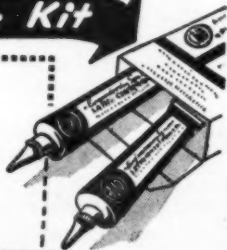
Dept. 11-BB, 1826 West 46th St., Chicago, Ill.

- ☐ Send circular on CMD Helical Groove Centers
- ☐ Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT LUBRICANT and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME.....

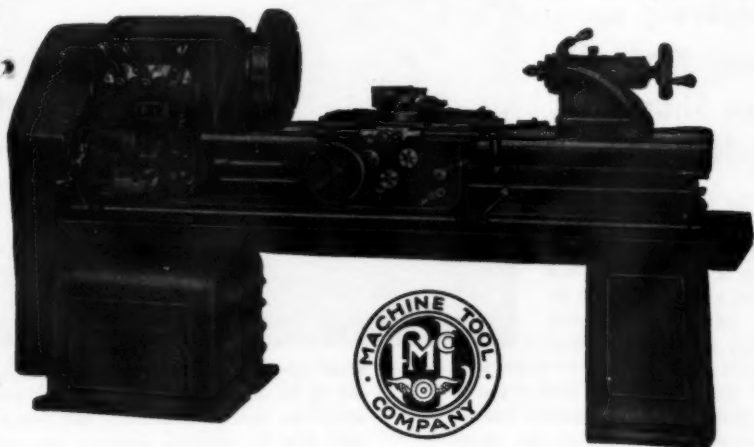
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ADDRESS.....



# Porter-McLeod

## Screw Cutting Engine Lathe



### 16 Inch—12 Speed—Geared Head—Quick Change

Swing over bed ..... 17"  
 Swing over carriage ..... 11½"  
 Dist. bet. centers (6' bed tailstock flush) 36"  
 Dist. bet. centers (tailstock overhung) 40"  
 Tailstock spindle travels ..... 5¼"  
 Tailstock spindle diameter ..... 2¼"  
 Taper of Centers ..... No. 3 Morse  
 Front spindle bearing ..... Timken  
 Rear spindle bearing ..... Timken  
 Hole through spindle ..... 1 5/16"  
 Diameter threaded nose ..... 2 3/16"  
 Number of threads on same ..... 7 per inch  
 Number of threads and feed changes. 40  
 Stand. lathe will cut following threads  
 per inch: 2, 2¼, 2½, 2¾, 2⅞, 3, 3¼, 3½,  
 4, 4½, 5, 5½, 5¾, 6, 6½, 7, 8, 9, 10,  
 11, 11½, 12, 13, 14, 16, 18, 20, 22, 23, 24,  
 26, 28, 32, 36, 40, 44, 46, 48, 52 and 58.

Leadscrew threads per inch, Acme thrd. 6  
 Width of Belt ..... 2½"  
 Steady rest opening ..... 4½"  
 Driving pulley, diameter ..... 9"  
 Revolutions per minute ..... 410  
 Highest gear ratio ..... 42 to 1  
 Number of spindle speeds ..... 12  
 Minimum & Maxi. speeds... 15 to 500 R.P.M.  
 Weight on skids (6' bed) ..... 3400 lbs.  
 Weight crated (6' bed) ..... 3700 lbs.  
 Wt. boxed for Ocean shipments. 4200 lbs.  
 Export boxes (6' bed)... 102" x 38½" x 62"  
 Weight per extra foot of bed... 150 lbs.  
 Size of tool ..... 1¼" x ⅝"  
 Largest diameter held in split chuck... 7"  
 Lathes furnished with 5, 6, 7, 8 and 10  
 foot beds.

**Engine Lathes    Cold Sawing Machines    Abrasive Cut Off Machines**

**PORTER - McLEOD MACHINE TOOL CO., INC.**  
**HATFIELD, MASSACHUSETTS**

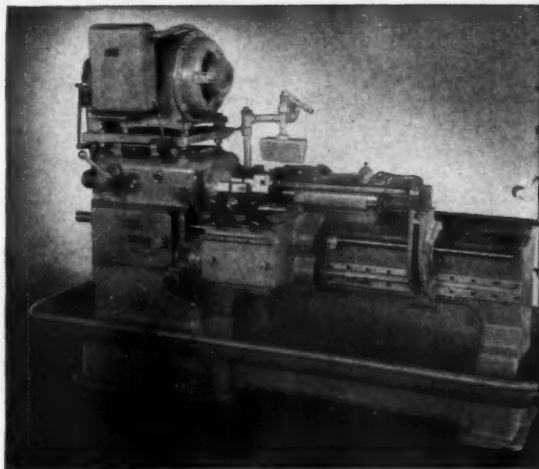
# Lo-swing MODEL LR LATHE

## For Economy and Consistent Accuracy on Volume Production or on Short and Medium Runs

Model "LR" is a fully automatic, cam-operated lathe, incorporating the time-tested Lo-swing principle of sufficient mass and rigid tool support. Its field includes practically any work within its capacity — 2" diam.

for normal stock removal, 4" diam. for light cuts, 5" diam. for flanged work — and up to 46" between centers in the longest bed length. This machine, while offering the utmost in flexibility, is 100% mechanical without any clutches in the feed train. Not only is the "LR" a very simple machine to service, but once set it cannot get out of time. All rotating shafts are anti-friction bearing equipped. Lubrication is adequate and automatic. Carriage ways are of hardened steel to provide greater wear resisting qualities.

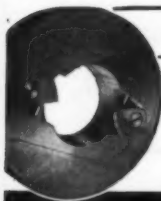
Ease of set-up and operation are provided by the built-in Seneca Falls **CHANGE-OVER MECHANISM** by which length of carriage stroke may be quickly varied; **CONVENIENT LEVERS** for throwing in and out the feed and



rapid traverse (normally automatic) manually, and by the **LOW CENTER HEIGHT (37")** which allows the operator to examine and adjust a tools from the operating position. Low center height also contributes to ease of loading.

Model "LR" Lo-swing is designed to provide maximum efficiency with carbide tools. It is a versatile lathe in that it may be equipped with either direct V belt drive to the spindle for high speed, fine finishing cuts, or a gear drive with pickoff gears for slower roughing cuts. The Model "LR" Lo-swing may also be equipped with a Third Slide (overhead) as well as additional back-squaring attachment carriages and carriage slides, making for innumerable tooling possibilities.

## SENECA FALLS *Automatic* WORK DRIVER



Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

**SENECA FALLS MACHINE CO.** **SENECA FALLS, N.Y.**

*In War, as in Peace...*

# **CERRO ALLOYS**

**SAVE TIME and CUT COSTS!**

**CERROMATRIX** (Melting Temp. 2500 F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, for engraving machine models, stripper plates, chucks, short run forming dies and other metal-working applications.

**CERROBEND** (Melting Temp. 1580 F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

**CERROSAFE** (Melting Temp. 1900 F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc.; as a filler behind delicate parts to be machined or ground in profiling or duplicating machines; sprayed on to protect wood core molds and patterns. Low temperature melting prevents distortions.

*WRITE for literature on any of the above alloys. Prompt deliveries on orders bearing Preference Rating of A-1-J or better.*

These three low-temperature melting alloys are helping to speed up production of war materials for the Army, Navy and Air Force.

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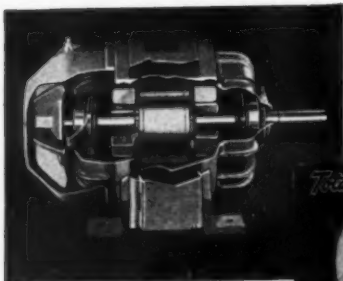
# **CERRO DE PASCO COPPER CORPORATION**

**40 WALL STREET**

**NEW YORK CITY**

# ELECTRIC MOTORS and DRIVES

by



**TYPE EA**

**TOTALLY ENCLOSED  
FAN COOLED  
1 TO 15 H. P.**



**PROMPT  
DELIVERY**

Reasonable deliveries can be made on both **TORQ MOTORS** and **TORQ-QUA-MATIC DRIVES** to plants with priority ratings.

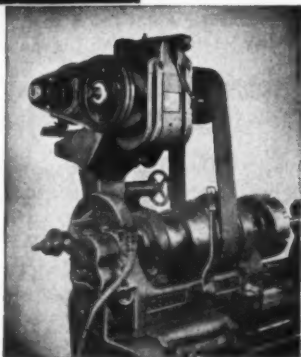
**BALL BEARING — STEEL BUILT — SEALED AGAINST HARMFUL OIL CHIPS AND ABRASIVES — MADE FOR REAL PRODUCTION**

## **TORQ-QUA-MATIC DRIVES**

**FOR MACHINE TOOL CONVERSION**

- A • 4 SELECTIVE SPEEDS**
- B • SIZES 1 TO 15 H. P.**
- C • ALLOY STEEL GEARS**
- D • ANTI-FRICTION BEARINGS**

**PROVEN DESIGN — IMPROVES PRODUCTION UP TO 25%**



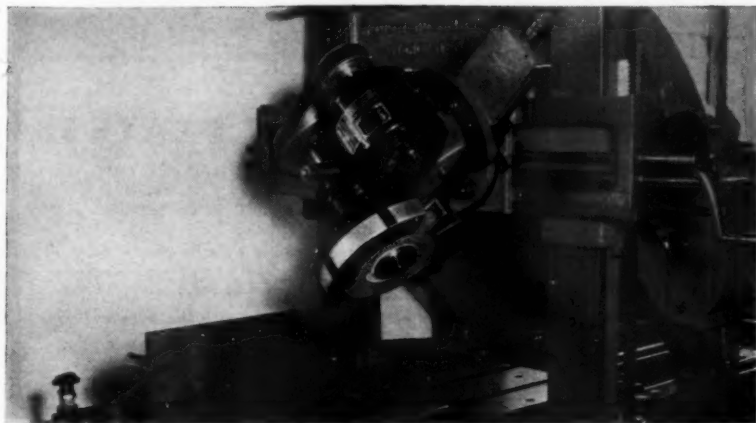
Send for **FREE** descriptive literature containing complete details and specifications on **TORQ MOTORS** and **TORQ-QUA-MATIC DRIVES**.

**THE TORQ ELECTRIC MFG. COMPANY**  
6605 CARNEGIE AVENUE • CLEVELAND, OHIO

# **S GRIND-ALL SUPER-PRECISION GRINDERS**

**FOR LATHES, SHAPERS, MILLING and BORING MACHINES**

**A Full Line of Portable Precision Grinders that Produce a Finish and Accuracy Not Before Attainable with a Portable Tool**



*Model M 1/2 H. P. GRIND-ALL Super-Precision Grinder mounted on planer.*

Now more than ever before it is necessary to hold the greatest accuracy on all kinds of parts going into the equipment for our Armed Forces. All of the GRIND-ALL Super-Precision Grinders have the built in qualities necessary to maintain this accurate performance for month after month of constant duty.

**No Grinder Manufactured By Us Has Ever Worn Out or Needed Replacement of Bearings or Other Parts, Although Some Have Run Over 15,000 Hours At High Speeds.**

GRIND-ALL Grinders are being used by many leading War plants for a wide range of grinding operations from grinding external and internal threads on plug and ring gages to external grinding on heavy tank axle shafts.

If you have a grinding problem our representatives are at your service for advice on standard and special applications of our GRIND-ALL Grinders to your particular job.

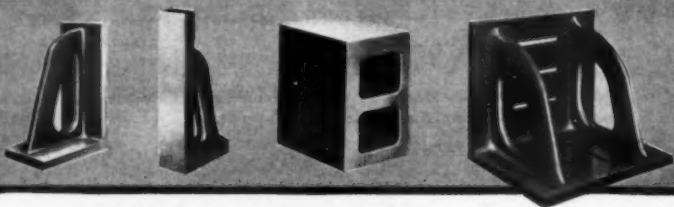
#### **4 STANDARD SIZES**

- 1/3 H.P. Motor. For wheels up to 6" dia.
- 1/2 H.P. Motor. For wheels up to 6" dia.
- 1 H.P. Motor. For wheels up to 12" dia.
- 2 H.P. Motor. For wheels up to 16" dia.

**EXTRA LONG QUILLS FOR GRINDING DEEP HOLES ARE AVAILABLE IN 8", 12" AND 16" LENGTHS.**

**GENERAL MACHINE TOOL CO.**

**• SENECA FALLS  
NEW YORK**



## **For Reliable Inspection PRECISION SURFACE PLATES, ANGLES AND CUBES**

Made of Meehanite—an unusual wear-resistant material of dense, uniform grain structure—that assures a smooth, flawless surface.

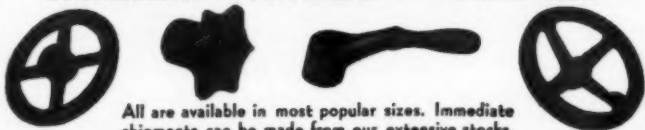
The surface plates have an extra heavy top supported by scientifically designed ribs which give the plates absolute rigidity and extra strength to the entire surface—from the center to the very edge. Ample clamping space is provided.

The angles and cubes are made of the same material with the same precision.

Send for folder giving complete information regarding sizes and prices.



## **WHEELS • KNOBS • HANDLES**



All are available in most popular sizes. Immediate shipments can be made from our extensive stocks.

# **MACHINE PRODUCTS CORP.**

**6767 McNICHOLS ROAD,**

**DETROIT, MICH.**





## TAKE A New Look AT YOUR AIR Operated Equipment

Many jobs on arbor presses, air chucks, riveters, air vises, cylinders, and other pneumatic machinery can be handled better at less than line pressure. Lots of jobs can be cut to half the ordinary line pressure; different jobs on the same machine can be handled faster and more accurately if proper adjustment for each job is simple and easy. Look over your air operated equipment with this in mind. Dependable pressure regulating valves, instantly adjustable to furnish the correct working pressure for each job, can help you get the most out of the air power now available, improve production, perhaps

avoid additional compressor investment.

Hannifin Pressure Regulating Valves give you an exclusive piston-type design that provides large volumetric capacity and sensitive, accurate control of working pressure. Adjustment can be made over the entire working range to deliver any reduced operating pressure desired. Construction is simple, for long, dependable service without maintenance.

Three standard sizes— $\frac{1}{8}$ ,  $\frac{1}{4}$  and  $\frac{3}{8}$  inch, for use on initial pressures up to 150 lbs. Furnished complete with pressure gauge. Write for Bulletin 88-H.

**HANNIFIN MANUFACTURING COMPANY**  
621-631 South Kolmar Avenue • Chicago, Illinois

# HANNIFIN *pressure regulating* VALVES

*In stock for immediate shipment*

# KUM-KLEEN STICKERS

with their magic adhesive backing  
**HELP SPEED PRODUCTION!**

- Only magic Kum-Kleen stickers:
- ✓ are applied without moistening
- ✓ are easily peeled off without leaving a trace
- ✓ yet never pop off
- ✓ adhere to any smooth surface including plastics, metal, glass, wood, varnish, and lacquer.

**SEND FOR SAMPLES & CATALOG TODAY!**

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U.S.

CORD CO.

Order No. 218-077000-1

Universal Microphone Co., Inc.

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SEX REPORT NO.

This item has been  
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PREPARED BY  
1000-42  
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SENDIX

SECTION

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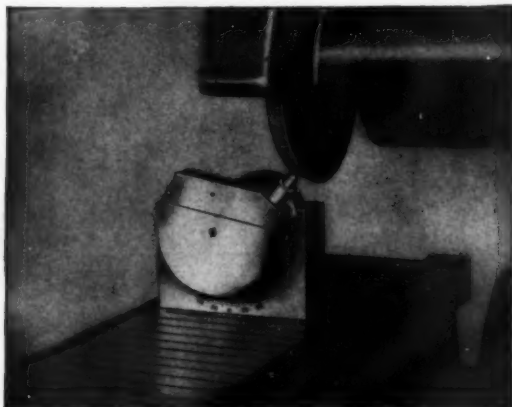
# Kum-Kleen

## STICKERS

Avery Adhesives, Dept. HH-11 451 East Third St. • Los Angeles, Calif.

# Welch

## QUICK ANGLE DRESSER



As suggested by its name, the Welch Quick Angle Dresser can be set quickly for dressing the grinding wheel to any desired angle. It is small, compact, durable; simple in design and construction. All surfaces are hardened and ground. Furnished in plain or Vernier type. Plain dresser graduated in degrees . . . Vernier reads in degrees and minutes. The Vernier being an integral part of the base block eliminates any possibility of error. 10 DAYS FREE TRIAL IF DESIRED.

**PLAIN TYPE \$70 NET**

**VERNIER TYPE \$82.50 NET**

One Diamond is Furnished with Each Dresser

*Write for particulars.*

# Welch INDUSTRIES, INCORPORATED

Makers of High Speed Milling Cutters—Form Tools and Special Tools  
20000 WEST EIGHT MILE RD. DETROIT, MICHIGAN

**ITS  
ADVANCED  
FEATURES  
APPEAL TO  
ENGINEERS  
AND OPERATORS**



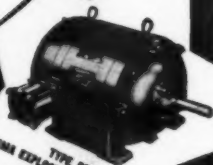
# LIMA ENGINEERED PERFORMANCE



TYPES F1 AND F2  
LIMA GEARSHIFT DRIVES



TYPE R. S.  
LIMA SPLASH-PROOF MOTOR



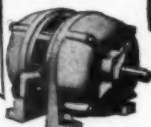
TYPE HX  
LIMA EXPLOSION-PROOF MOTOR



TYPE F1D  
LIMA GEARSHIFT DRIVE



TYPE F2D  
LIMA GEARSHIFT DRIVE



LIMA STANDARD TYPE L  
ALL-PURPOSE MOTOR

Lima Electric Motors, Lima Gearshift Drives and Lima Magnetic Polishing Lathes, have proven themselves on the War Production Front.

In addition to simplicity of design and ease of installation, Lima's are engineered to meet the War Production Board's constantly increasing demands on production machines in your plant. Lima engineers, aware of today's vital speed requirements, are at your service - consult them on any questions of motorizing your production equipment. Proven engineering recommendations are at your disposal. . . Keep War Production up with LIMA ELECTRIC MOTORS - LIMA GEARSHIFT DRIVES - LIMA MAGNETIC POLISHING LATHES - PROMPT DELIVERIES



LIMA MAGNETIC  
POLISHING LATHE

LIMA ELECTRIC MOTORS - SIZES  $\frac{1}{4}$  to 75 H.P.  
FOUR TYPES OF LIMA GEARSHIFT DRIVES  
TYPE F1 DIRECT DRIVEN UNITS 1 to 5 H.P.  
TYPE F2 DIRECT DRIVEN UNITS  $\frac{1}{4}$  to 25 H.P.  
TYPE F1D BELT DRIVEN UNITS 1 to 5 H.P.  
TYPE F2D BELT DRIVEN UNITS  $\frac{1}{4}$  to 25 H.P.  
LIMA MAGNETIC POLISHING LATHES

## THE LIMA ELECTRIC MOTOR CO.

LIMA O. OFFICES: NEW YORK · CHICAGO · DETROIT · U.S.A.

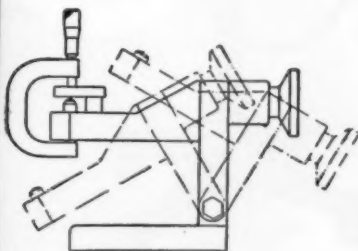
LIMA ELECTRIC MOTORS · LIMA MAGNETIC POLISHING LATHES · LIMA GEARSHIFT DRIVES

# New C-66 SAFETY RADIUS DRESSER for SURFACE GRINDERS

A low-priced, rugged attachment for any make of surface grinder. Mounts directly on magnetic chuck. Dresses wheel without dismantling machine—a one hour job in 10 minutes.



*Safety feature, hands are kept from under the wheel.*

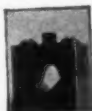


*Setting diamond with micrometer for accurate radius.*

The C-66 will accurately dress wheels to both male and female radii. Operation is open and easy to see. For dressing wheels, for grinding turning tools, the dresser is set at angle equal to clearance angle of tools. The C-66 is the only radius dresser with this feature.



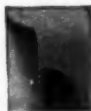
**Long Wearing  
Chisel Point  
Diamond**



**Vee Ground in  
Center of  
Arm**



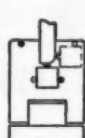
**.013 Male  
and Female  
Radius**



**.500 Male  
and Female  
Radius**



**180° and 90° Male Dressing**



**Prompt delivery from factory in Newark.**

**Price, without diamond, \$72.50. 1/4K diamond \$5.00.**

**SCHULTZ & ANDERSON CO.,**

**109A EDISON PLACE,  
NEWARK, N. J.**

**TAKE THE TOOL RIGHT TO THE JOB!**



**STOW**

**FLEXIBLE SHAFT MACHINES**

For grinding,  
sanding,  
wire-brushing,  
drilling,  
buffing,  
polishing  
filing . . .



A Stow unit cleans up in a hurry—anywhere in the plant—those hard-to-get-at jobs that so often form bottle-necks... saves the day when finishing of irregular-shaped pieces can't be done by ordinary machine set-up! For pinch-hit jobs, rush repairs, toolroom operations, or steady production-line work, Stow is the "one best tool" that saves time and money! Write us today for the new Stow Catalog!

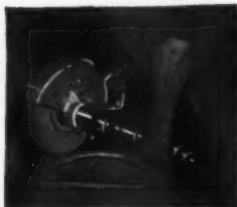


**STOW FLEXIBLE DRILL-SHAFT**

gets into close quarters, works where regular drills can't reach. Lengths up to 48"—drill sizes up to  $\frac{1}{4}$ ".

*Ask for literature.*

**STOW MANUFACTURING CO., INC.**  
30 Shear St. Binghamton, N. Y.



Multi-Speed Machines permit production grinding with the proper size wheel and speed for your job.



A wide variety of rotary files and burs with suitable handpieces enable fast work in cramped spaces.



*Ask for  
this book..*

## SHOWING HOW BRYANT SERIES 5 INTERNAL GRINDERS CAN HELP YOUR PRODUCTION

The 30 page Bryant Series 5 Internal Grinder Catalog is profusely illustrated with photographs and line drawings that show how these machines can save time and money in the tool room and on production work. Many pages are devoted to instructions for set-up and operation which will prove of particular value to those already using Bryant Series 5 Grinders. One section shows chucks and holding fixtures for many types of jobs; another section shows the Bryant line of standard wheel heads.

Use the handy coupon to get your copy.

Please send me my copy of the Bryant Series 5 Catalog. I understand there is no obligation.

Name

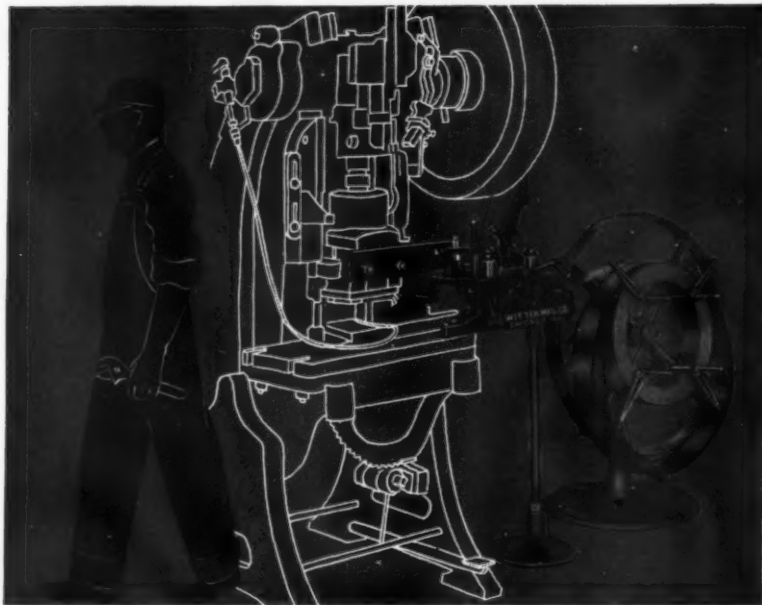
Company

Street

City  State

**WAR PRODUCTION** *rolls out faster with*

# **WITTEK** *Automatic* **ROLL FEEDS AND REEL STANDS**



The major problem confronting industry today is increased war production. Manufacturers of metal stampings must recognize automatic feeding of coiled strip stock to punch presses as vital to the solution of their problem.

Wittek Automatic Roll Feeds and Reel Stands are designed and built by engineers with years of experience to guide them. With Wittek you can conserve man-hours and maintain new high production schedules.

★ Write for Descriptive Catalog

**WITTEK** MANUFACTURING CO., 4305-15 W. 24th Pl., Chicago, Ill.



# AMIC Comparator

This modern instrument is designed for accurate, convenient and quick checking of components, either in the tool room or on the production line—permitting precise gaging throughout the whole day without eye fatigue. Each small line on the scale represents 1/10,000th of an inch. Replaces in many instances special gages.

## A REMARKABLE IMPROVEMENT

Clear reading on 6" scale, with inch and millimeter readings. Magnification is 1000.

Measuring capacity is plus or minus .003" and plus or minus .05 mm.

Pointer comes to rest immediately.

Pointer moves in the plane of the scale, thus avoiding any error in measuring due to parallax.

Provision for convenient lifting of the contact pin.

Two fine adjustments for easy setting.

Convenient red mark limit hands control tolerances.

Interchangeable backstops and accessories.



*Our longstanding experience is at your disposal.  
Consult us regarding your measuring  
problems—we will solve them.*

## AMERICAN MEASURING INSTRUMENTS CORP.

40 West 22nd Street

New York, N. Y.

Manufacturers of Gages, Jigs, Fixtures, Service Tools.

# THE NEW *Thompson*

The Thompson Spring Collet Adapter is new in design — efficient in action. Consisting of only two parts it fits all standard spring collets — grips tight, no slipping — accurate. Made for all taper spindle machines, it eliminates heavy, bulky chucks — gets you closer to work. Time saving — economical. Give your machanic a better adapter — specify "Thompson".



Write for literature  
and prices of special  
adapters.

TRADE MARK  
*Thompson*  
REG. U.S. PAT. OFF.

## AUTO-ORDNANCE CORPORATION

THOMPSON TOOL DIVISION

342 WEST PUTNAM AVENUE GREENWICH, CONN.

# SPRING COLLET

## Adapter

"Give me a Thompson Spring Collet Adapter and I'll turn out faster and better work. I like them because they're sure gripping and accurate. And best of all they eliminate bulky chucks which means I have free access to the work. The shank, sleeve, wrench and standard spring collet are simple, yet economical and efficient."



Illustration shows the spring collet adapter as applied to vertical milling machine — takes standard collets — can be used in any machine having a taper spindle.



Double application of spring collet adapter on milling machine — eliminates heavy bulky chucks — free access to work and cutter — note closeness of cutter to proximity to work.

## AUTO-ORDNANCE CORPORATION

THOMPSON TOOL DIVISION

WEST PUTNAM AVENUE GREENWICH, CONN.

# LIBERTY



## VERTICAL HIGH SPEED GRINDING ATTACHMENT



The NEW LIBERTY high speed grinding attachments are designed for quick simplified setups in order to maintain the best possible results in the tool room. They are excellent for grinding gages, angles, slots, recesses, and surfaces which are either impossible to get at with a large wheel or require difficult and expensive setups in which small wheels are a necessity.

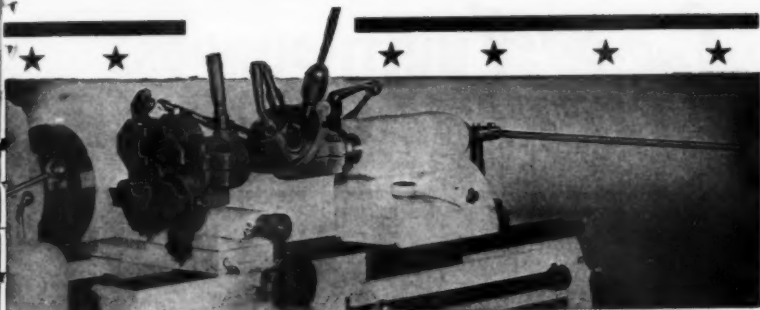
Designed for the most accurate service in grinding tools and various kinds of mechanical equipment.

**SEND FOR CIRCULAR GIVING  
FULL DETAILS.**

### LIBERTY TOOL AND GAGE WORKS

235 GEORGIA AVE.

PROVIDENCE, R. I.



# Convert

## YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS

Yes, it's as easy as that! You simply attach the Jefferson Tail Stock Turret, the Jefferson Tool Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.

**DELIVERY IN  
15 DAYS**

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times NINE DIFFERENT TOOLS.

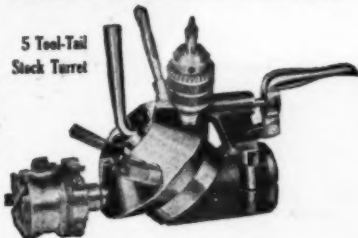
With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe or changing tools. The JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.

**JEFFERSON BULL DOG  
PRECISION MILLING MACHINES**

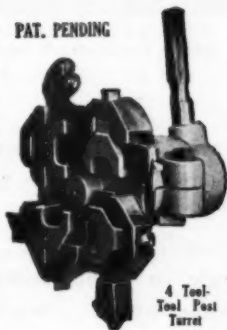
Obtainable Floor or Bench Type Power Feed. Capable of close tolerances on die sinking, contour profiling, angular milling, jig boring, routing of ferrous, non-ferrous metals, fibre and plastics for production line or tool-room. V-belt drive.

Write for further details, also literature on the Jefferson Precision Milling Machine, Milling Machine Dividing Heads, Vises, Swing Frame Grinder, Endless Belt Sander, Foundry Riddle.

5 Tool-Tail  
Stock Turret



PAT. PENDING



4 Tool-  
Post  
Turret

# JEFFERSON MACHINE TOOL CO.

700 W. FOURTH ST.,

CINCINNATI, OHIO

# *Saw-way* MULTI-PURPOSE **INTERNAL GRINDER**



Headstock moved back and at angle position for grinding tapered hole.

Looking down on top of machine from grinding spindle end.

**O**ffers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6' . . . grinds holes  $\frac{1}{4}$ " to 18" in diameter . . . holes up to 9" deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

*Distributors throughout the U. S. and Canada to serve you.*

***Saw-way* TOOL AND MACHINING CO.**  
13838 JOS. CAMPAU AVE. DETROIT, MICHIGAN

# NEW

## Heat Measuring Control for More Accurate Heat Treating

Adds Exact Amount of Heat  
for the Correct Time Needed

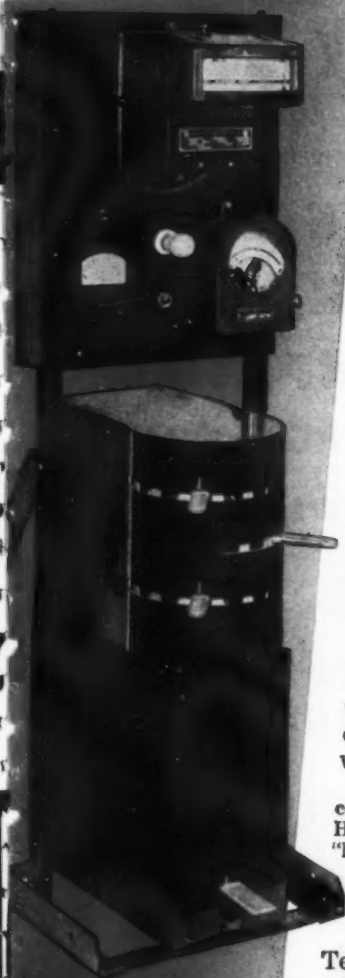
- ★ Unbelievably accurate temperature control.
- ★ Corrects operator's setting errors.
- ★ Permits prediction of size change to closer limits.
- ★ Eliminates finish-grinding on many High Speed Steel tools.

The new, tested and proved UPTON Heat Measuring Control temperature controller adds the exact amount of heat for any piece of work, puts the heat into the salt bath for the exact period it is required and then, when the time is up, shuts the heat off and tells the operator to take the work out.

Unlike the conventional "on and off" control with its wide fluctuations, the Upton Heat Measuring Control varies between a "high" and "low" temperature value, rather than an "on" and "off". The current supply never goes "off" except when the operator has made an error. Then it shuts "off" and warns him.

Tell us about your heat treating problem.

for more information about the New Upton Heat Measuring Control.



*Send Now..*

UPTON ELECTRIC FURNACE DIVISION  
Commerce Pattern Foundry & Machine Company

We build the furnace using the

**ELECTROTHERMIC-  
PERMEATION**

principle of operation.

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# DANLY KWIK-KLAMPS

**TOGGLE CLAMPS  
FOR QUICK, POSITIVE  
CLAMPING IN  
ANY POSITION  
WITH**



**OR STRAIGHT  
CLAMPING BAR**

WRITE YOUR DANLY BRANCH  
**DANLY MACHINE SPECIALTIES, INC.**  
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Ducommun Metals & Supply Company, Los Angeles; San Francisco

**DANLY** DIE SETS and DIE  
MAKERS' SUPPLIES



# In a Class by Itself...

**Available Now !**

## **NO OTHER SHAPER OF ITS SIZE CAN DO THIS JOB:**

A "hog cut" in cold rolled steel  
9/32" deep—40 strokes per minute—.008 crossfeed—all **WITHOUT A QUIVER!**

A job like this one can be done on the Porter-Cable 7" Shaper because it has *chain drive* and a *flywheel-type crank-pin plate*. The chain-drive eases the load of heavy cuts by distributing it over five gear teeth, with no backlash. The flywheel action produces smooth, effortless cutting . . . with the heavy cast iron crank-pin plate absorbing cutting shock and tool vibration.

There is reason after reason why this great little shaper is doing heavy-duty work at low operating and upkeep cost . . . why it is qualifying for production and toolroom jobs alike. Examine its many features . . . investigate its outstanding performance. Call your local Porter-Cable man—name in phone book—or write us today for full information and prices.

## **PORTER-CABLE 7" SHAPER**



## **Porter-Cable Wet-Dry Belt Surfacers**

**Does Faster Milling, Planing, Grinding !**

Lots of jobs formerly done on millers, planers, and grinders are now done free hand, **TEN TIMES FASTER**, with this amazing surfacer. Limits as close as .0008" with simple fixtures. Get the facts on this great new machining method! Write for our big new booklet! Free!

**AT THE POWER SHOW-**  
See this many-featured machine demonstration. You'll find us in spaces 7 and 701 from November 30th to December 5th, at Madison Square Garden, New York.

**PORTER-CABLE MACHINE CO.**

300-11 Exchange Street

Syracuse, New York

# Increase your Tapping Output *with this New Unit*

Proconier Universal Tapping Machines give increased output, more accurate tapping and tremendously increased tap life. The features that make this possible include: 1. Four speeds, ranging from 390 to 2050 R.P.M. efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to  $\frac{1}{2}$ " through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain pre-set tap feeding and reversing pressure **INDEPENDENT OF OPERATOR.**

## Tap Establishes its own Lead!

The new Proconier Universal Tapping Machine is exclusively designed so that it actually allows the tap to establish its own lead. There is nothing more accurate than a precision ground thread tap as a guide for tapping—so maximum tapping efficiency is attained where an accurate tap is free to establish its own lead in cutting the thread.

This exclusive Proconier feature means more accurate tapping with every thread uniform, greater production with less spoiled work and less tap breakage.

## Send for Catalog

giving full details, description and prices on the full line of Proconier Universal Tapping machines, hand or foot operated, the complete line of Proconier Precision Tapping Heads to meet all needs and the new Tru-Grip Tap Holder.

**THE PROCUNIER SAFETY CHUCK CO.**  
14 S. Clinton St., Chicago, Illinois

# *Proconier*

Proconier Safety Chuck Company,  
14 S. Clinton St., Chicago, Illinois

Send me bulletins on: ☐ High Speed Tapping heads ☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines.

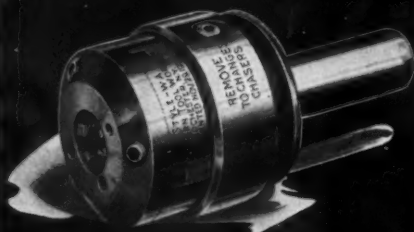
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# MODERN ROTARY TYPE SELF-OPENING DIE HEADS



"WA" Die Head—Ring Type, for opening and closing



"WB" Die Head—Trigger Trip Type

## Made in 4 sizes having capacities:

Straight Threads from  $\frac{1}{8}$ " to  $1\frac{1}{4}$ "  
Straight or Taper Pipe Threads  
from  $\frac{1}{8}$ " to  $\frac{3}{4}$ ".

Send for your copy of Bulletin M-142 on Modern Rotary Type Self-Opening Die Heads.

FOR

## Fast, Accurate and Economical Thread Cutting

- Least number of parts.
- Simplest construction.
- Hardened and ground throughout.
- Cut close to shoulder threads without special chasers.
- Easily adjusted for thread size.
- Require no springs to operate movement of chasers.

CONSOLIDATED MACHINE TOOL CORPORATION  
**MODERN TOOL WORKS**  
DIVISION  
ROCHESTER, NEW YORK

★ ★ ★ ★

Another forward step in clamping operational. In fact, four forward steps—each contributing a definite speed factor in production.



★ **MIDGET CLAMP.** Improved Model. Toggle bar strengthened, with bolt retainer now integral with bar. Spindles uniformly centered. Exceptionally practical in holding small parts where heavy clamping pressure is required. Spindle has rubber cap.



★ **PARALLEL CLAMPING PLIERS.** The extended parallel jaws aid clamping efficiency by exerting pressure uniformly over greater area. Particularly effective in gluing plywood. Two-spindle adjustment. Already extensively used in aviation industry on plywood gliders and training planes.

★ **L-CLAMP.** Designed for clamping small parts, either in assembly or production jobs. For use in limited spaces or where large throat capacity is required, such as in the clamping of L-sections in aircraft construction. Handles at right angles to clamping position.



Perhaps **YOUR** plant can make advantageous use of one of these or other Knu-Vise features. Ask for a demonstration in your plant.

★ ★ ★ ★

**4 More**

**KNU-VISE  
FIXTURES**  
To Speed Up  
Your Clamping  
Operations



★ **U-SHAPED TOGGLE BAR.** Permits simultaneous clamping of many parts regardless of their thickness. Two spindles with rubber caps, adjustable horizontally and vertically, are pre-set at required locations and remain in these fixed positions during continuous operations. Handle in horizontal position when closed.

**KNU-VISE**  
INCORPORATED

**IMMEDIATE DELIVERY**

**1334 Plum Street • DETROIT, MICH.  
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*Simple, Sturdy*  
**CJB AHLBERG**  
*Ball Bearing*  
**PILLOW BLOCKS**



1. Precision self-aligning ball bearing.
2. One-piece sturdy housing.
3. Removable end cap.
4. No drag labyrinth seals.
5. Simple mounting wrench.

*Ahlberg All-Bearing Service is complete and convenient — made available through several hundred leading Supply Houses and 20 Factory Branches which carry stocks and provide engineering help.*

**THESE** **CJB** pillow blocks are not a new development, but a proven design, with a ten year service background.

Their compactness and simplicity of design make them ideal for light and normal service, where a reliable yet inexpensive bearing is required.

The full self-aligning, precision type ball bearing, is mounted in a one piece, Parkerized, and accurately machined housing. Seals, to protect the bearing and retain lubricant, are non-wearing Neoprene rings, which turn with the shaft and float in the housing.

This labyrinth seal type of seal is frictionless, long wearing, and exceptionally effective.

This series is available in shaft sizes from  $\frac{1}{4}$ " to  $2\frac{1}{2}$ ", in either fixed or expansion types. Closed end type is optional.

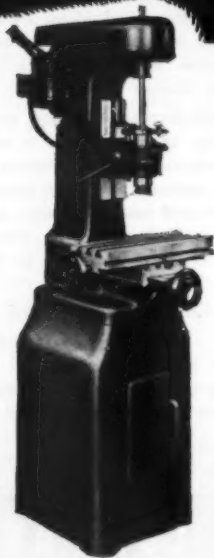
**AHLBERG BEARING COMPANY**

*Manufacturers of CJB Master Ball Bearings*

**3009 West 47th Street - - - Chicago, Ill.**

# THE IMPROVED LINLEY HIGH-SPEED VERTICAL MILLING MACHINE AND JIG BORER

**A COST-CUTTER ON SMALL PRECISION WORK  
LARGER TABLE AND MORE CLEARANCE**



This new machine pays for itself on die, jig and fixture work as well as molds for plastics, metal pattern work, laying out, drilling, milling and boring operations.

Fast and simple with correct speeds to insure safety to tools. Ball bearing equipped; micrometer screw feed head.

Use the LINLEY and release your large machines for heavy work. *Write for Descriptive Bulletin and detailed specifications.*

**LINLEY BROTHERS CO.**

**663 STATE ST. EXT.**

**BRIDGEPORT**

**CONN.**

**U.S.A.**

# WYCO TOOLS



## WYCO Angle Drilling Heads

90°, 45°, 30° and Universal types including new small sizes for airplane work—for production drilling, countersinking, etc., in close quarters or hard to reach places. Angle heads can be chucked directly in air or electric drill, or coupled to flexible shaft extension.

- WYCO 90A-1 90° Angle Head
- WYCO 90A-2 90° Angle Head
- WYCO 45A-2 45° Angle Head
- WYCO VA-1 Universal Angle Head
- WYCO 00A-2 Flexible Shaft Extension
- WYCO 00A-1 Flexible Shaft Extension
- WYCO 30A-1 30° Bent Drill

- 1/4" dia.
- 3/8" dia.
- 1/2" dia.
- 5/8" dia.
- 3/4" dia.
- 7/8" dia.
- 1" dia.



## WYCO Hy-Speed Saw

Attaches to any 1/4" electric drill. Saws out or files holes of any shape. A high speed ball bearing production tool, takes standard hack saw blade or 1/4" round file.



## WYCO Replacement Flexible Shafts

Replacement Flexible Shafts with patented non-metallic innerliner and standardized couplings to fit any motor, 12 sizes—7/8" to 1/4". Stocked by Industrial Distributors.

Prompt Deliveries on all high priority orders

**WYZENBEEK & STAFF, INC.**  
838 W. HUBBARD ST. CHICAGO, ILLINOIS



*Fall in*  
**FOR**

*Victory*

that's what  
**AVEY DRILLING MACHINES**  
are doing

All over the Production Front, Avey Drilling Machines fall in for Victory, particularly our MA-6, a six speed machine with a two speed motor, three mechanical changes through gearing, 8 to 1 speed range. Built in — No. 2 and No. 3 sizes. One to six spindles (any size). Push button control. Any spindle may be equipped with Avey-matic Feed, or Reversing Motor Control for Tapping.

**THE AVEY DRILLING MACHINE CO.**  
CINCINNATI, OHIO, U. S. A.



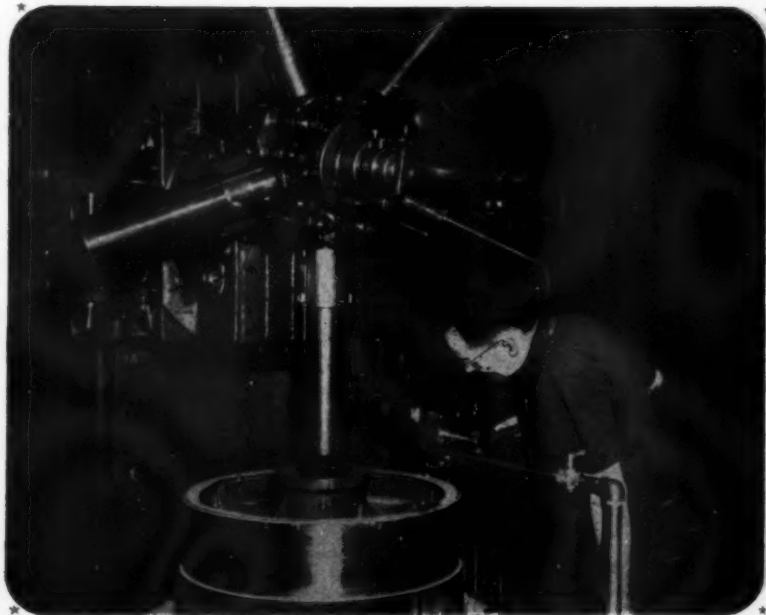
CINCINNATI, OHIO

**THE AVEY DRILLING MACHINE CO.**  
Cincinnati, Ohio, U. S. A.

*Avey*

**DRILLING  
MACHINES**





## THERE'S MORE THAN ONE SHOT IN THE TOOL STEEL MAGAZINE

**F**OR every machining job, there is a tool steel which will produce optimum results as regards the amount of work done per machine hour and per grind.

Teaming up the right tool steel with the job frequently shows phenomenal improvement. For instance, with a connecting rod broach made of DBL High Speed Steel, a well-known engine builder secured 13,533 pieces for the life of the broach, against a previous

best average of 8000 pieces. The increase is almost 70%. A similar company, using 3/8" twist drills made of DBL, secured an average of 30% more holes per grind than with 18-4-1.

War production calls for the best possible performance from every machine tool, new or old. Let our engineers help you to determine the right tool steels to use on your jobs, for improved results. At the same time, they'll make you familiar with

the best alternate steel, for your protection in the event of possible future shortnesses in supply.



**Allegheny Ludlum**  
STEEL CORPORATION  
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA



**ELIMINATE**  
*"Power Drop"*  
**on DEFENSE PRODUCTION**

with *MALL* TRADE MARK **CONSTANT HIGH SPEED GEARED HEAD GRINDERS**

**GEARED HEAD**

### Reduce Rejects • Lengthen Tool Life

- Operate independently of all other tools on 110-220 or 220-440-volt 3 phase, 60 cycle current
- Deliver 3450 r.p.m. Geared head steps speed up to 4500 r.p.m.
- Provide constant speed underload
- Tools are free from motor weight
- Furnished with castor base or overhead trolley mounting for maximum portability
- Interchangeable tools for Grinding, Disc Sanding, Wire Brushing, Polishing and Drilling—can be changed as easily as bits in a brace
- Available for Priority Production. Write for literature and prices.

## MALL TOOL COMPANY

7742 South Chicago Ave. Chicago, Ill.

### USE IT FOR

- Grinding Off Welds
- Finishing Dies
- Wire Brushing Scale from Pipes
- Snagging Castings
- Cleaning Metal
- Sharpening Tools
- Finishing Propeller Blades
- Drilling in Wood, Stone, Concrete, Steel
- Polishing and Buffing



# THE NEW LABOR ARMY LIKES THESE MACHINES

These "minute women of '42" by the hundreds of thousands are setting a smooth fast pace on batteries of Delta low-cost Drill Presses, Grinders, Saws and other Delta machines. A few months ago they didn't know the difference between a drill press and a punch press—a cut-off machine or cut-off switch. Now they are handling their machines like veterans and meeting production quotas with ease.

Management likes these machines too, because "breaking in" women and unskilled labor can be done in an unusually short time. Most important, skilled mechanics are released for more difficult work.

## DELTA DESIGN Always Offers You These Advantages

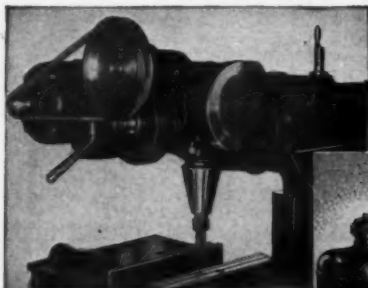
- Low First Cost
- Low Maintenance Cost
- Economical Operation
- Reduced Labor Costs
- Greater Flexibility
- Portability



Send for "TOOLING TIPS" showing how other manufacturers are taking advantage of the many features of DELTA-Milwaukee machines. Also for latest complete catalog. Get in touch with your Delta Industrial Distributor or write to The Delta Manufacturing Company, 604-M E. Vienna Ave., Milwaukee, Wis.

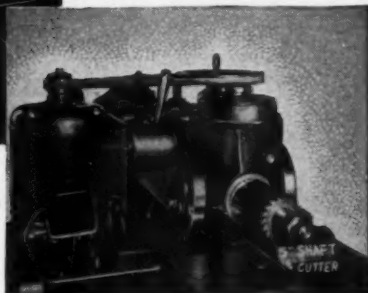


# **Convert** ——— **YOUR SHAPER INTO MILLING MACHINE**



← **SHAPER MILL WITH  
SPINDLE IN VERTICAL  
POSITION**

**SHAPER MILL TAKING  
CUT  $\frac{3}{4}$ " DEEP, WITH A  
 $1\frac{1}{2}$ " CUTTER.** →



The BRAUER UNIVERSAL SHAPER MILL provides the solution to one important problem in the present machine-tool shortage, that of obtaining sturdy, dependable milling machines.

Twelve or more spindle speeds of from 60 rpm to any speed required may be obtained by interchanging pulleys on motor and mill. Easily fitted to different sizes of shapers; light in weight, small in size, making it ideal for shops in ships and portable shops having a shaper available.

Built to handle any type of milling work. The spindle bore is No. 4 Morse taper with socket for end mill work and for  $1\frac{1}{4}$ " and 1" arbors for ordinary milling. The machine may be turned for milling through an angle of 90°. Motor and spindle are so arranged that the Shaper Mill may also be used for grinding.

**WRITE TODAY FOR PRICE AND FURTHER INFORMATION**

*Manufactured By*

**BRAUER MACHINE AND SUPPLY CO.**

**OKLAHOMA CITY, OKLA.**

**P. O. DRAWER 1469**

# GAIN HOURS WITH THIS NEW WHEEL!

IT'S STEPPING UP GRINDING SPEED 2 TO 5 TIMES FOR OTHERS. LET IT DO SO FOR YOU

**C**ERTAINLY you'll say "show me" to anything that promises to speed production and save you money. That's all Por-os-way asks—a chance to prove on your regular work the savings that it is making for others. This new grinding wheel is different from any you ever used. It brings results that would be hard to believe if proof were not so easy.

**LIKE A SPONGE.** The structure of this new wheel is *cellular*, not compact. This porous, sponge-like texture contains millions of air cells that cool each tiny grinding point between contacts. Therefore, you can take deeper cuts—even .010" or more—with ease, or your regular cut faster! Grinding speed is usually "upped" 100% to 400%. Production per man, per machine, increased 2 to 5 times!

**NOT A STOCK WHEEL.** Por-os-way wheels are manufactured in various porosities,

grades and grains. Radiac representatives "prescription fit" this wheel to your needs. Por-os-way is never sold from stock.

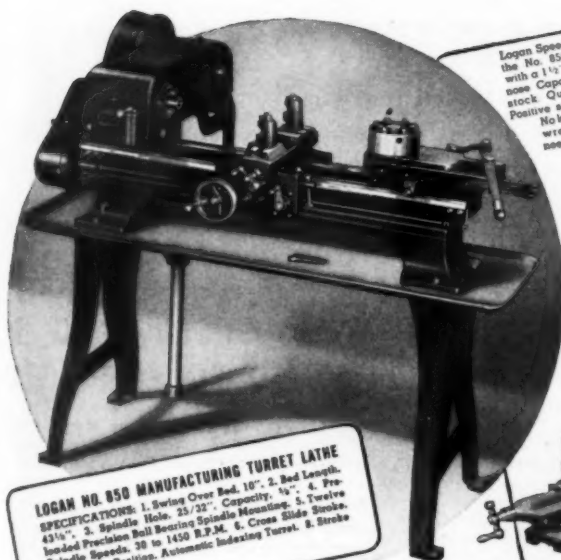
**COOLER, FREE CUTTING.** Even inexperienced mechanics find the Por-os-way wheel easy to use. It rarely "burns" work. Use Por-os-way on hard tool and die steels. You'll find it holds its corner and requires very little dressing. Use it, too, on softer materials—copper, tin, wood, plastics. Por-os-way is free cutting, has little tendency to load.

**MAKE A "PROOF TEST".** Figure the effect on your production of speeding up grinding 2 to 5 times! The first step to gain this end is to make a "proof test" demonstration of Por-os-way. Write today for the new Por-os-way booklet with "prescription blank" that helps determine the wheel for your job.

**POR-OS-WAY\***  
*a new*  
**RADIAC\* PRODUCT**

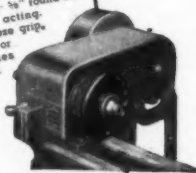


ASK FOR A  
DEMONSTRATION



**LOGAN NO. 850 MANUFACTURING TURRET LATHE**  
 SPECIFICATIONS: 1. Swing Over Bed, 10". 2. Bed Length, 43 1/2". 3. Spindle Hole, 25/32". Capacity, 1/2". 4. Precision Precision Ball Bearing Spindle Mounting. 5. Twelve Spindle Speeds, 30 to 1450 R.P.M. 6. Cross Slide Swive, 3 1/4". 7. Six Position. Automatic Indexing Turret. 8. Stroke of Turret, 4 1/4".

Logan Speed Collet Chuck for the No. 850 Lathe or others with a 1 1/2" x 8 thread spindle nose Capacity 3/8" round bar stock Quick acting Positive squeeze grip. No keys or wrenches needed.



The LA-3 Tailstock Assembly and the LA-13 Compound Rest Assembly (below) will permit the No. 850 Turret Lathe to be used also as a standard screw cutting lathe. The Tailstock Assembly must be ordered with lathe as it must be matched with headstock on factory.



## FOR CONTINUOUS PRODUCTION OF SMALL PARTS

This new Logan Lathe is the answer to war industry's demand for a fine, small production lathe, in order that larger machines may be released for heavier work. With a maximum capacity of 1/2" round bar stock, the No. 850 Logan Manufacturing Turret Lathe will turn out small parts with the same speed and accuracy as that of larger machines, and the investment is considerably less. Advanced design and engineering, combined with the same high quality standards that have characterized all Logan Lathes, are assurance of long and satisfactory service.

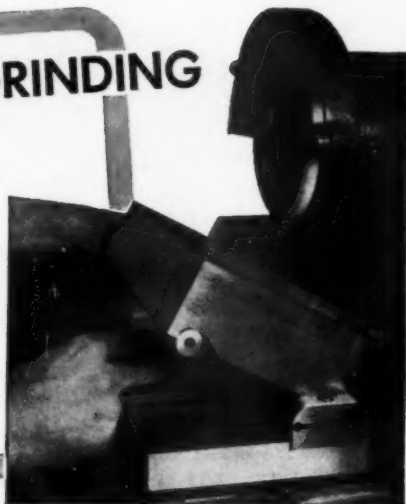
**LOGAN ENGINEERING COMPANY • CHICAGO, ILLINOIS**

*Logan*

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

# ANGULAR GRINDING SET-UP TIME

*Reduced*  
FROM **hours**  
TO **minutes**



Any angular grinding set-up—either single or compound—can be completed in a few seconds with the Magna-Sine. The unit itself is precision-built and, by utilizing standard gage blocks, every angle is determined to the exact limits of the blocks used. The Magna-Sine has no screws or nuts to tighten or loosen . . . requires no clamps . . . provides guaranteed magnetic efficiency.

In present production, the Magna-Sine not only saves time and money, but reduces to an absolute minimum "down-time" of the grinders on which angular work is done.

Magna-Sines are available in two sizes in both compound and single angle magnetic models. Non-magnetic models are also supplied for the accurate inspection of angular machining work.

*Write for full details.*

## THE MAGNA-SINE

**ROBBINS ENGINEERING COMPANY**

318 MIDLAND AVENUE

DETROIT, MICHIGAN



PLAIN MILLING CUTTER  
HEAVY DUTY

HALF SIDE  
MILLING CUTTER

STAGGERED TOOTH  
SIDE MILLING CUTTER

## MIDWEST MILLING CUTTERS AND HOW BEST TO USE THEM

**HEAVY DUTY PLAIN MILLING CUTTERS**—This type of cutter is recommended where there is heavy production milling of materials in soft or alloy steel, bronze or copper. They have coarse pitch, undercut teeth with maximum backing behind cutting edges and ample chip space.

Midwest standard heavy duty mills have a smooth cutting action; they set up an end thrust which keeps the spindle tight in its bearings and eliminates chatter because they are made with 45° left-hand spiral teeth.



**HALF SIDE MILLING CUTTERS**—a type for heavy-duty straddle milling operations where only one side of the cutter is required for milling; also used frequently in pairs to mill a slot to fixed width but where finish at bottom is not important.

These mills have spiral, undercut teeth which provide particularly free-cutting action. Compared with side milling cutters, these half side mills show lower power consumption, more pieces per grind, and less idle machine time due to cutter changes.

**STAGGERED TOOTH SIDE MILLING CUTTERS**—This type of mill is exceptionally free cutting. For that reason it is ideal for deep slotting or the milling of keyways. The top teeth are undercut and have an alternate right and left-hand helix angle, which greatly reduces end thrust.



Since drag ends (inefficient tooth portions) are eliminated, increased chip room is obtained, and chip lengths are broken up, giving them the characteristic snap out of the cut. The sides of the teeth having no cutting action are "dished"

slightly toward the recessed part of the cutter and this eliminates "bugging" of the cutter sides and, in turn, scoring the sides of the slot.

Many other types and forms of metal cutting tools are made by Midwest; catalog No. 17 contains illustrations and extensive information on them.

Any metal cutting problem inquiry you make will be carefully studied and analyzed. Suggestions and recommendations will be returned to you on types of tools to employ and how best to use them—a Midwest service entering its 31st year.

**MIDWEST TOOL & MFG. CO.**  
2362 W. Jefferson Ave. Detroit, Mich.



END MILLS • SLEEVES • COUNTERBORES • DRILLS  
SPECIAL TOOLS • REAMERS • FORM TOOLS  
CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS



*Precision* METAL CUTTING TOOLS



# FILING HELPS

to meet your War-time needs

## GENERAL PURPOSE FILES

## MISCELLANEOUS FILES

**HELLER**

WAVY TOOTH FILES  
MILLED CURVED TOOTH  
NUCUT VIXEN NUCUT  
SWISS PATTERN FILES

## VALUABLE FILE WALL CHART

33 BY 33 INCHES

With a handy hook so you can hang it almost anywhere in your shop, this attractive NUCUT File Wall Chart illustrates and describes the files you are most likely to use in your daily work. Files for general machine shop use, mill files for sharpening large saws and various types of tools and for lathe work, Swiss Patterns for precision filing, rasps for wood, lead and other soft materials—all these NUCUT files, as well as genuine VIXEN milled-tooth files, are shown and the important facts briefly displayed.

You'll find your men will refer to this chart constantly. It is also an excellent aid for teaching apprentices and trainees. If you're now conducting a class in employee education, you have here all you need to give your men a basic practical understanding of war-time files and filing.

## MANUAL OF FILES AND FILING

This book is a handbook of information on files and filing. Within its 64 pages you can find the information you need for selecting a file of the right length, width, shape and cut, for practically any filing need.

## FILING HELPS FREE!

If you can use this NUCUT File Wall Chart, or one or more copies of the Manual, write and tell us your requirements. There's no obligation.

## HELLER BROTHERS COMPANY

Newark, New Jersey • Newcomerstown, Ohio  
America's Oldest File Manufacturers • Good Tools Since 1836

**HELLER**

**WAVY TEETH  
FILES**

PATENT No. 2037039

# This VITAL MATERIAL Can Solve YOUR PROBLEMS

## Engineers for Rent ...the Efficient Way to Get Things Done

Sudden demands for re-design or new tooling usually load an engineering department beyond its capacity. Man-power and technical "know-how" suddenly become vital materials, urgently needed. LaSalle can supply those missing elements promptly and at a cost which—*all elements considered*—proves the LaSalle way to be the most economical answer to the problem.

For example, a certain manufacturer needed 130 new dies in a hurry—and his engineering department was already loaded. He called upon LaSalle. We broke the job down into workable components for simultaneous work by several groups—and delivered the 130 designs in nine days. We had the

"know-how" and the men to make such performance possible. Our client's regular engineering department was not disturbed in any way, and he saved both time and money.

That's the way LaSalle works day in and day out. We can fill your temporary engineering needs on a job basis—or we can help you re-arrange your plant for more effective production. You get from us as much or as little service as you need—and you pay for nothing more.

It costs nothing to find out how LaSalle's staff can serve you best. Prepare now for those unseen contingencies by getting acquainted with LaSalle methods and functions. We'll be glad to supply the details at your request.



Among the clients who use LaSalle Designing Company to assist and supplement their own departments are these:

**Allis-Chalmers Mfg. Co.**  
**Boeing Aircraft Co.**  
**Crane Company**  
**Curtiss-Wright Corp.**  
**Douglas Aircraft Co., Inc.**  
**The Electric Auto-Lite Co.**  
**Elgin National Watch Co.**  
**Gisholt Machine Co.**  
**Nash Kelvinator Corp.**  
**Nordberg Mfg. Co.**  
**R C A Mfg. Co., Inc.**  
**Zenith Radio Corp.**



MANAGEMENT ENGINEERING

A SIZE AND TYPE FOR EVERY OPERATION \*



FOOT CONTROL



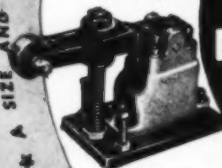
HAND CONTROL



ALL AIR CONTROL

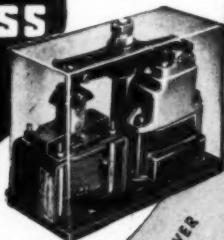


PILOT CONTROL



MECHANICAL CONTROL

*Our Business...*  
**AND OUR ONLY BUSINESS**  
**ROSS**  
*Air Control*  
**VALVES**



SOLENOID CONTROL



THE BRIDLE FOR AIR HORSEPOWER

*... is Vital to Your War Production Program*

**Y**OUR plant is vital to the war production program because of its specialized ability to produce its particular products. The specialized ability of the thousands of American factories has created the world's greatest war production machine . . . in an incredibly short time.

We are specialists in our business. Our specialized experience, ability, and equipment are engaged in the production and servicing of only one item of equipment—air control valves.

Ross Air Control Valves are vital in keeping production rolling at wartime speed . . . in plants where guns, tanks, ships, planes, bombs, and ammunition are made. Undoubtedly air control valves in your plant are doing their part in helping to maintain

day and night war production.

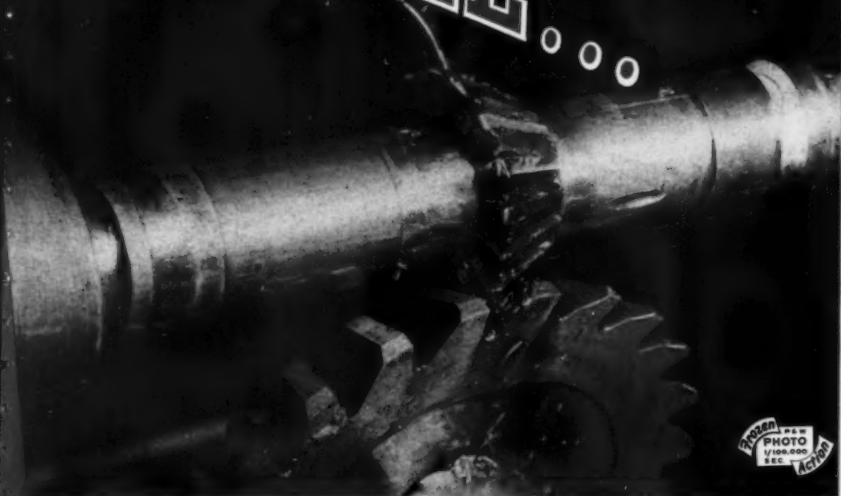
Because we are air control valve specialists, we, too, have an important job. Right now, that job is to help you keep your air control valve equipment functioning at peak efficiency . . . under the strenuous strain of wartime operation. Whether your equipment utilizes Ross Air Control Valves or air control valves of any other make, our service is at your command. A nation wide service organization of trained Ross engineers stands ready to bring you a quick solution to your air control problems . . . saving you precious man hours and priceless machine hours.

Keep your production humming its song of Victory by bringing your air control problems to us. Write, telephone, or wire. By helping you do your part, we can do our part.

**ROSS Operating VALVE CO.**

6480 Epworth Boulevard . . . Detroit, Michigan

# A NEW ANGLE...



P&W Photo—Universal

## but with this difference

This is a taper cutter in the making . . . getting its teeth milled . . . here acquiring what we call "backing off." The angles on these teeth are tremendously important for strength, chip clearance and smooth, accurate cutting ability. Yet you never need worry about them . . . that's our job. We've spent long hours finding out what they should be . . . and we give you the right cutters to do your job.

If you have this P&W taper cutter — or any other P&W small tools, machine tools, or gages — note this: *war production is burdening P&W products with more high-speed, unrelenting work than their purchasers ever expected . . . yet P&W products are standing up in this ordeal, delivering all the accuracy of finished work always associated with this superior line.*

Don't let undue concern for your P&W equipment stand in the way of all-out production. *Don't spare the pressure . . . your P&W tools can take it.*



# PRATT & WHITNEY

Division Niles-Bement-Pond Company  
WEST HARTFORD • CONNECTICUT



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HELP AIRCRAFT PRODUCTION

**HIT A NEW HIGH!**

**SKILSAW BLOWER** Operated at 130° for drying glued joints fast in ANY WEATHER!



**SKILSAW** speeds crating and uncrating, protects contents, and saves materials.



**SKILSAW BENCH GRINDERS** for quick, convenient sharpening of bits, tools, twist drills.



EVERY MAN

COUNTS FOR MORE

USING SKILSAW TOOLS!

When America's aircraft industry started to zoom it started adding **SKILSAW TOOLS** in quantity . . . to speed up countless operations . . . to get more work done on every shift . . . to build far faster the planes that are flying to Victory! Today those **SKILSAW TOOLS** (and thousands more) are helping production **SOAR** to heights undreamed of only a year ago.

Are there jobs in your shop that should be done quicker? Talk to your distributor about the big complete line of **SKILSAW TOOLS**. He can tell you what models will help you most . . . and he'll gladly prove it with a demonstration on your own work.

**SKILSAW, INC.** 5095 Elston Ave., Chicago, Illinois

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Los Angeles • Oakland • Portland • Seattle • Toronto, Canada

**SKILSAW DISC SANDERS** grind down welds, clean metals, file, buff and polish.



**SKILSAW BELT SANDERS** for all sanding and polishing on wood and metals.



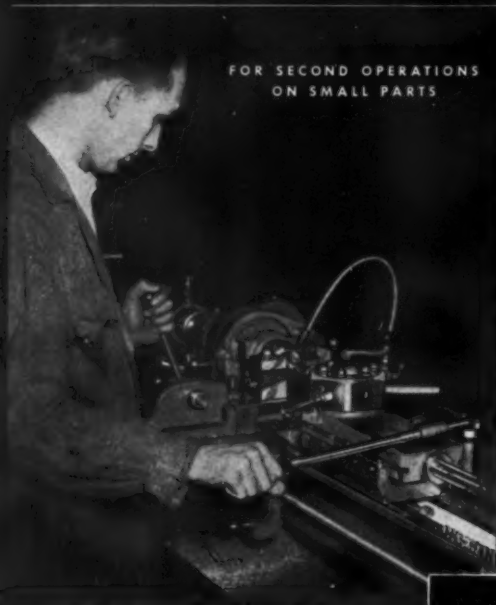
# Featured In This Issue

- Already, several million women are engaged in war production work in England—and they're doing very well indeed. More and more women will be working in our plants, of necessity. Wendell E. Whipp, President, Monarch Machine Tool Co., told of his Company's experiences in hiring women at the recent New York meeting of the N. M. T. B. The story begins on page 71
- Chip Breaker Designs are an important factor in the performance of carbide tools. W. L. Kennicott, Tool Engineer, McKenna Metals Co., Latrobe, Pa., gives some timely information on page .....89
- Common-sense methods in the use of dowel pins, and the good and bad features of various types are discussed in Mr. Williams' offering on page .....101
- How can a company determine if a new employee meets the minimum standards? How much should an operator know? These are some of the points discussed in connection with the Lycoming Div., Aviation Corporation's job-testing program commencing on page .....117
- The use of models in speeding war production is discussed by H. E. Chesbro of The G-E Co. He tells how his Company uses miniatures advantageously in laying out aviation fields, power plants, etc., on page .....127
- The important matter of Waste Reduction is the theme of Edmund Mottershead's third contribution to the Foremanship Forum.  
Starts on page .....137
- John E. Hyler discusses various types of machines and their applications in the fourth installment of his series of articles on The Aspects of Modern Milling, on page .....161
- Modern methods of aptitude testing endeavor to eliminate square pegs in round holes. M. G. Heuer tells how it's done, starting on page .....173
- Welding operations on heavy, bulky objects are facilitated by the use of positioners. Carleton Cleveland tells how some of them are being used, on page .....185
- Harvesting the Scrap is by Paul C. Cabot, Deputy Chief, Conservation Division, W.P.B. Mr. Cabot describes the organization for collecting scrap and tells how its different branches function, on page .....199
- President H. P. Bailey of Rotor Tool Co., has made a real contribution to the cause of conservation in his "Keep 'Em Working" program. See page 205
- A new and faster method of finishing airplane engine connecting rods by surface broaching is discussed on page 209
- The principles of Temp-A-Trol Welding, the most recent development of Progressive Welder Co., are described briefly on page .....213
- In precision grinding departments and other shop sections where temperature uniformity is important, spot air conditioning is the answer, as discussed by L. W. Clifford of Westinghouse Electric & Mfg. Co., East Springfield, Mass. See page .....216
- "Let's Talk Shop" is the regular shop notes feature—20-pages of interesting, diversified items beginning on page 219
- Tooling Up for Victory offers the latest in tools and equipment, commencing on page .....258
- Plants Available for Subcontracts 354
- Mechanics Thru the Ages .....380

# New

# SOUTH BEND TURRET LATHES

FOR SECOND OPERATIONS  
ON SMALL PARTS



## Series 1000 Turret Lathes

The Series 1000 Turret Lathes have a  $1\frac{1}{8}$ " spindle hole,  $10\frac{1}{2}$ " swing over bed, and 1" maximum collet capacity. They are made in bench and floor types—with or without coolant equipment. Standard equipment includes quick change gear box, power feed universal carriage, handlever cross slide, compound rest cross slide, and handlever bed turret. Standard extras (not included in prices of lathes) include 4-way turret tool block, tailstock, collet attachment, taper attachment, thread dial indicator, and micrometer carriage stop. Write for Bulletins 1002 and 1004 which contain complete information and specifications.

Designed for the rapid machining of small duplicate parts, the new Series 1000 South Bend Turret Lathes are especially adaptable to second operation work. Their speed, accuracy, power and versatility make possible rapid production without sacrificing either efficiency or precision.

Features that contribute to the versatility and efficiency of these lathes are: the smoothly operating handlever bed turret, the handlever cross slide with double tool blocks, the compound cross slide with power longitudinal feeds and power cross feeds for the universal carriage, forty-eight thread cutting feeds driven by a precision lead screw, and a wide range of spindle speeds.

Standard extras simplify tooling this lathe for war production and make it easily convertible to other work when peace comes.



## SOUTH BEND LATHE WORKS

SOUTH BEND, IND. LATHE BUILDERS FOR 35 YEARS





## *As The Editor Sees It*

**I**F a lie is repeated often enough, and loud enough, it may gain in credibility. Or to put it more bluntly, you can always fool some of the people some of the time.

Americans have always had a weakness for embellishing and passing along unfounded or "tall" stories. In ordinary times, it's harmless enough. But these are war times!

Elmer Davis, OWI Director reminds us that:—"Hitler, who conquered a continent by warring on minds, said in 1933—'Artillery preparation for attack . . . will be replaced in future war by psychological dislocation of the enemy through revolutionary propaganda. The enemy must be disorganized and driven to passivity. Our strategem is to destroy the enemy from within, to conquer him through himself. Mental confusion, contradictions of feelings, indecisions, panic . . . these are our weapons.'"

This reveals the undoubted axis source of many of the vicious rumors that have been spread by otherwise loyal Americans . . . poisonous gossip and distorted tales directed against our Allies, our Government, our armed forces, racial and religious minorities in our country.

Some of our war production plants have met this situation with special bulletin boards for the posting of rumors . . . the only stipulation being that all rumors must be signed by the purveyors.

The best way of discouraging rumor vendors is to pin them down with a cold, dispassionate query as to the source of the information. There's no "kick" peddling rumors in an atmosphere of skepticism and disbelief.

*Wesley G. Paulson*

# **RYERSON**

## **Founded in 1842**

### **Completes**

## **One Hundred Years of**

### **Steel-Service**

November 1, Joseph T. Ryerson & Son, Inc. will mark its one hundredth anniversary, the completion of its first century of steel-service.

In 1842, men came to the little Ryerson store for iron to make horseshoes, axles and rims for wagon wheels. Today, there are ten great plants in as many key industrial centers.

In peace—Ryerson stocks supplement the tonnage required for production schedules, and meet all rush requirements for factory maintenance and repair.

In war—These stocks made possible quick change over to war production, and are now breaking bottle-necks—supplying emergency steel of every kind—to the factories that are speeding up the flow of war equipment to our men in the field.

For one hundred years—through peace and war—fires and floods—the nation has turned to Ryerson stocks for the quick shipment of steel for every purpose.

Based on this long successful record, we expect to serve with even greater speed and accuracy in the years to come.

JOSEPH T. RYERSON & SON, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

# Women in Production Work

By WENDELL E. WHIPP\*

**W**E in the machine tool industry in normal times have used very few women employees on machine production in our plants. Most of the work has been considered as being more suitable for the physiques of men than women, and with a plentiful supply of men available, we have until recently given little or no thought to employing women operators in our plants.

The present scarcity of men has brought many of us face to face with the necessity of employing women in our factories, just as has been done previously in Britain and Canada during this war. Many of us will remember the part women employees played in war production in America during the first World War, when the man power shortage did not begin to reach the acute stage it has already reached now. In all countries, women are now taking over more of the work ordinarily done by men.

We are all familiar with the very large percentage of women successfully performing all classes of machine and assembly operations in the gun, ammunition, aircraft and machine tool plants in Britain and later in Canada as well.

Today, especially in the great Western Aircraft Plants, and in most sub-contractors' plants making parts for aircraft, women constitute at least one-fourth of the working force; and we learn that in many of these plants,

future personnel plans call for the employment of more women than men.

In many of our aircraft plants, women long since have been working alongside of men, without any distinction whatever as to occupation or as to rate of pay.

So, in employing women in the machine tool industry, I do not feel that we are venturing on an uncharted course.

Now let me tell you frankly about our experience in our own plant.

Like many of you, we had been thinking for a long time about the possibility of employing women, but we had not actually been doing anything about it.

Then on the 1st of March, this year, we went to 3-shift, 7-day operations—and with that step, realized we had reached the practical limit of available man power in our area.

We felt that sooner or later we would have to employ women. But I doubt whether we would have done anything about it as soon as we did, had there been plenty of qualified men available.

Among the women making application for employment was one in particular who showed unusual promise. She was a mature woman, with a background embracing considerable busi-

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\*President of The Monarch Machine Tool Co.,  
Sydney, Ohio



ness and legal experience. It occurred to us that we might well take her on, and use her as, you might say, as a laboratory experiment with the idea that if she proved out, she could then act in the capacity of "Supervisor of Women", or "Dean of Women", or whatever you might name that position, in case we later employed a large number of women in our plant.

So, early in May, we employed this woman, along with 2 others, and put all 3 in the production control department.

During June and July, we began to employ more women in production control and in stock checking. The men replaced by women were put on production jobs elsewhere in the factory, to replace men entering the armed services and to fill other shortages.

In the meantime, this particular woman whom we thought eventually might be the "Supervisor" in our shop

A year ago, Ed. Sundholm, President of Superior Mfg. Co., Albert City, Iowa found he had more contracts for war production than his crowded shop could handle. He converted his brand new model dairy farm building into a model factory and with women workers, is producing vital munitions for the U. S. Army. The illustrations are from Official O. W. I. photos by Ann Rosener.

literally tried out one job after another, thruout our plant.

She went from department to department, trying out the jobs on a wide variety of machines. The purpose was, frankly, to find out whether a woman could perform these operations. She was successful in performing almost all of them. As a result of her personal experimentation on these different operations, we were convinced that in our plant, women could successfully undertake almost any of the jobs which had been performed by men.

This brought us up to the 1st of August. From that date on, women have been added to our factory force as rapidly as they could possibly be absorbed.

On our No. 1 shift, which is the day, shift, we have 95 woman in the machine division.

On our No. 2 shift, from 4 P. M. to midnight, there are 102.

As of today, out of a total factory force of 2,600, there are 300 women.

On our No. 3 shift, from midnight to 8 A. M. we have 103 women. These women are about equally divided between machine operation and assembly.

Generally speaking, the women in the older age brackets are assigned to the assembly division, and the younger women are used in the machine division, because of their capacity to learn, the operations rapidly and their dexterity in handling machines.

I want to emphasize the fact that on all 3 shifts in our plant, women are used to operate all types of machines

# MILLING ACCURATE KEYWAYS



## TIME REDUCED 50%

### USING A **GORTON**

#### SUPER-SPEED VERTICAL MILLING MACHINE

*with a Simpler, Faster Set-Up*

**MILLING ACCURATE KEYWAYS** on airplane engine impeller drive shafts is done on a Gorton 9-J Miller in half the former time (6.3 minutes per piece floor to floor), holding a tolerance of  $\pm .001$ ".

The keyway is .188" wide x .440" long, having a .020" radius in the bottom corners. A two-flute end mill is run at 2800 r.p.m. This continuous high speed is made possible on the Gorton Super-Speed Vertical Miller because it has precision pre-loaded bearings, perfect balance, and rigid design. After each

fifty pieces, the cutter is re-sharpened on the Gorton 375-2 Cutter Grinder, which not only resharpenes the cutter flutes, but forms the .020" radius as well.

This is but one of many examples of how Gorton Super-Speed Millers and Gorton Cutter Grinders save vital hours of machining in aircraft and other plants producing war equipment. Perhaps our engineers can assist you in saving additional time on your high-speed milling. We will be glad to make recommendations—no obligation.



#### DEVELOPS A QUICKER WAY TO DO THE JOB

A milling department leadman in a big aeronautical plant, William Van Way, has worked out this simpler, cheaper, entirely adequate Fixture for holding hollow impeller drive shafts. Sketch shows details. Only a few simple items are needed. An angle support has a tongue, fitting in the table slot. A bushing on the vertical leg centers the shaft, which is held by a long bolt through the shaft and bushing. The depth of the milling cutter is set by a thickness gauge from top of fixture. This effective device replaces the previous expensive set-up, reduces loading and unloading time to minimum.

#### SUPER-SPEED MILLING DATA

**OPERATION**—Mill Key Slot .188" wide x .440" long, .020" radius in corners.

**MACHINE**—Gorton 9-J Super-Speed Vertical Miller.

**PART**—Gear Impeller Drive Shaft.

**CUTTER**—2-Flute, High-Speed Steel End Mill.

**HOLDING**—Simple Special Fixture as illustrated.

**FEED**—Hand.

**SPINDLE SPEED**—2800 r.p.m.

**FLOOR-TO-FLOOR TIME**—6.3 minutes.

#### FREE

Write for your copy of Bulletin 1400-B covering Gorton Super-Speed Vertical Milling Machines. It explains their 8 exclusive advantages for handling work faster and cheaper. Used for milling dies, molds, and miscellaneous or production work.

## GEORGE **GORTON** MACHINE CO.

**49 Years**

1317 RACINE STREET, RACINE, WISCONSIN, U.S.A.

SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

with the exception of planers, heavy turret chucking lathes, and other heavy work.

Women have proved themselves well able to handle all types of machining operations, and our only differentiation between men and women thus far has been entirely on the basis of degree of physical effort.

If in the future, if our supply of available man power should be even still more seriously curtailed, we would not hesitate for a moment to assign women to the operation of the heavier classes of machines. Of course, if we did so, we would have to provide them with adequate work lifting facilities, so as to reduce the amount of physical effort involved in their operation.

As new employees, women have shown themselves just as capable of learning how to operate machines as have the new men. In fact, with respect to some types of operations, they have shown themselves superior to

men. Let me give you a few illustrations:

We have found that women do particularly well in work requiring consistent care and alertness—in jobs where it is necessary to work to close tolerances, involving the use of gauges, micrometers, and other checking equipment, but calling for little physical exertion.

We have found, too, that women excel in work requiring manual dexterity and speed in repetitive movements. This is especially true in work which permits the operator to set her own tempo, and where she can work in a sitting position.

At the same time, we are not sure that whether a woman sits down or stands up at the job makes any great difference. We have found that most of the women in our plant prefer to stand up at a job at which they might just as well be able to sit down on a stool.



# IT'S THE OFFENSE THAT WINS BATTLES

*Since 1940, the Nazis have won battle after battle. Why? Because they've waged one offensive after another.*

**ALTER EGO:** Yes, but they've been able to do that. They started their war production offensive 10 years ago so they had a big edge on us in tanks, planes and guns. Then we really started competing.

*So competition forces progress. Look how in two years, our production offensive has already surpassed that of the Axis—turning out better weapons and more of 'em. These new arc welded M-4 tanks, for example. They'll soon be in our fighting offensive.*

**ALTER EGO:** It's thrilling but don't let it get us complacent. Haven't we learned never again to be caught unprepared in war . . . or in business competition either?

*There you have it! Let's start TODAY waging a planning and designing offensive so we'll be on the alert with better welded products and lower costs to get the upper hand on our competition the minute the post-war Battle for Business begins!*

**Ask your inner self if it isn't  
the offense that wins battles**

**THE LINCOLN ELECTRIC COMPANY**  
CLEVELAND, OHIO

*then I said to myself—*  
**IT'S A GREAT JOB  
—WELD DONE!**



A few days ago one of our foremen noticed a woman, working at an assembly bench, standing on a small clean box. He asked her why. She said—"These new shoes are tight and they hurt my feet, so I took them off. I'm standing on this box to keep my feet clean and not lose any time." The foreman immediately gave her plenty of nice clean corrugated paper to stand on until she could find a more comfortable pair of shoes.

I just pass that incident on to you as evidence of the type of willingness to carry on that motivates so many of these women that we have just recently put to work.

I think these women realize pretty well that in working in our plant, they are helping to win the war. They are finding that a woman can help in this

war just as well as a man, and they are determined to do their part just as well as a man could do it.

Now, to go back once more to the point mentioned a moment ago—that woman are entirely capable of handling larger and heavier machines if adequate work handling facilities are provided. Let me give you an illustration:

The other day one of our superintendents noticed a woman on an assembly job where it was necessary for her to lift a weight approaching to the 25 pound limit prescribed by Ohio laws. He asked the foreman to change her to a lighter assembly job. The woman said:

"I'll work any place you put me, but I don't want you to get the idea that this job is too heavy for a woman. I'm no panty waist."

I cite this instance simply to show that as far as we can see, women are not asking for any discrimination or any special consideration because of their sex.

And that, of course, is one of the reasons why we have adopted our wage policy with respect to women.

Our starting rate for women is 5c less per hour than the starting rate for men, with an automatic 5c hourly rate increase at the expiration of a 30-day probationary period.

Woman employees who have been thru the 6 weeks' training course in the vocational department of our local schools start at the same wage as men.

In the operation of our own vestibule training school, women going thru the school and starting along with men in the same classes go into our plant on the same pay basis as men.

In short, while it is necessary for psychological reasons, under some circumstances, to start women at a rate slightly lower than that under which men are started, we are operating on the principle that women are entitled to equal pay with men for equal work







# WHEELS of PROGRESS

## SYMBOL of VICTORY

Planes and more planes, machines and more machines and back of them goes our symbol of victory. We at BAY STATE are proud of our trade mark. To us it reflects the power of production embodied in abrasive products. To us it shows our part in the gigantic world-wide battle of production.

With greatly expanded kiln and oven capacity, new modern presses, increased personnel, BAY STATE offers greater production, quicker delivery and more accurate grade control of all types of resinoid and vitrified bonded abrasive products. Wheels of Progress indeed!

# BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.



done; and this, we are convinced, is the only fair basis of compensation.

You may be interested in the actual mechanics of putting women to work. Our new girls are usually put to work in pairs, side by side in the same department. Our Supervisor of Women introduces the girls to the foreman of the department, and paves the way for their acceptance in that department.

The girls feel that they can talk to our Superintendent of Women on any personal matters which have to do with the feminine side of the picture—but they are definitely under the foreman, and their foreman is the boss.

The question of work costume seems to be one which has bothered many companies who have considered employing women. In our shop, this worked out very naturally, without any difficulty whatever. The girls adopted, more or less as the standard costume, slacks, a sleeveless shirt, bandana handkerchief, and the machinist's apron. There were variations in colors and styles, and of course each girl likes to get her hair done in whatever way

she chooses, but on the whole, feminine costume in our plant conforms to a general type which is practical for the sort of work performed.

Back in the days of not so long ago, we wondered what would be the effect on morale if we brought women into the shop.

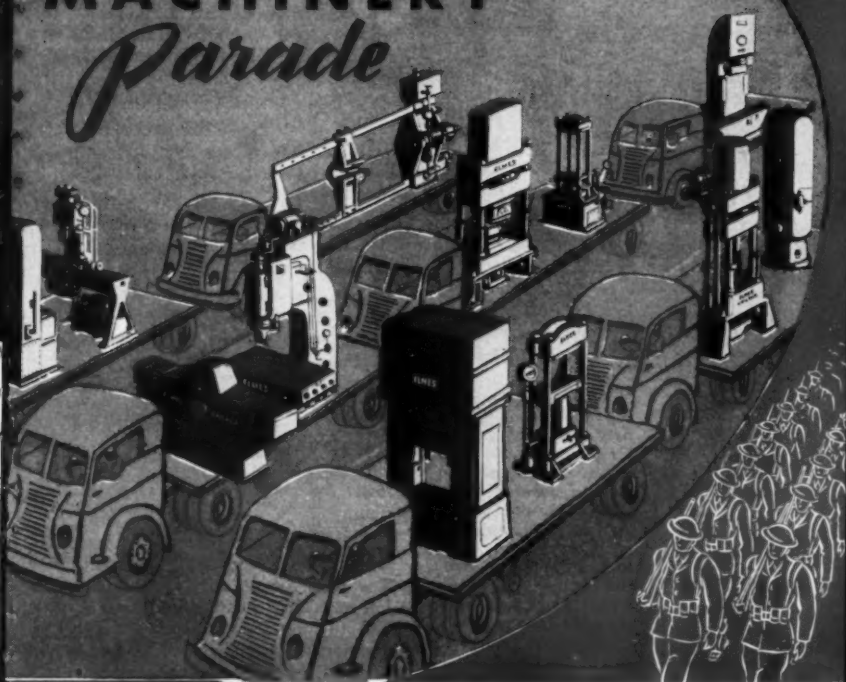
I can tell you without any reservations that so far as our own plant is concerned, I believe the net result has been that of stepping up the morale of the entire organization.

I wish you could go out with me into our plant and see the people working there, turning out the lathes that Uncle Sam has to have to win this war. They are all working side by side—handsome girls and women, strapping young men, older women, men of middle age—all plowing ahead—stepping together to get the job done.

There is a sort of comradeship that develops from this mingling of the sexes in the plant which we never used to have when we had all men.

What develops from this situation is a realization that everybody not just

# The HYDRAULIC MACHINERY *Parade*



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men, not husbands, sons and fathers—but women too, sweethearts, wives and daughters—everybody—must get out and work, and work hard, to turn out what it takes to win this war.

I am convinced that all of us in the machine tool industry must of necessity prepare for the employment of women in rather large numbers before this war production emergency is over.

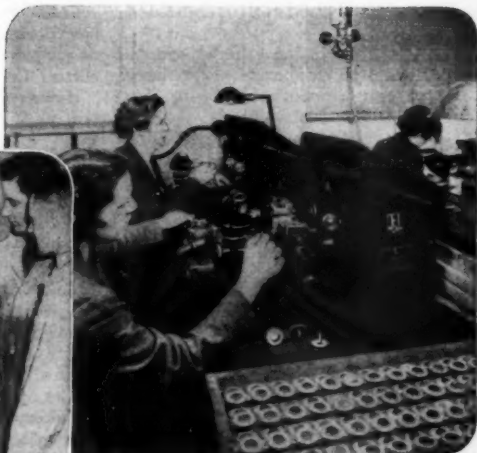
And on the basis of our experience, I believe that those of you who still have this transition before you, may be agreeably surprised.

I think you will find women far more attentive to their jobs than is the case with most men.

The girls take their jobs seriously. When you walk out thru the plant, you will see that the girls have their eyes on their work. They are not looking around the shop—they are not grumbling about this or that. They are frequently asking for suggestions as to how they can do their work better, and we are getting some mighty valuable ideas from some of the women in our plant.

For instance—to save floor space, our lathes are placed very close together. The work boxes are at the ends of the lathes. This meant that the operators had to step from the normal working position in front of the lathes to the ends of the lathes, in the course of the loading and unloading operations.

After one of our girls had been operating one of our lathes for several days, she asked the foreman if she could please have a little stand on each side of her, so that she could operate the machine without taking a single unnecessary step. Here was an example of a woman applying in the plant, exactly the same work-saving principles which she had learned in her kitchen. Every woman learns how to save steps in the kitchen. A man might not think about it—but a woman thinks about



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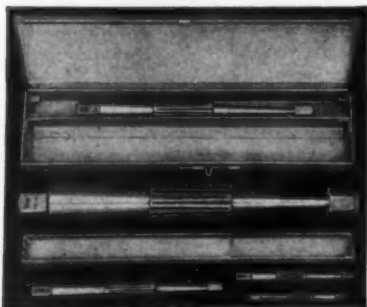
saving steps, and the result is increased output.

Now, in conclusion - there are 2 things I want to emphasize particularly to all of you in connection with this matter of employing women:

Don't get right up to the dead-line without making preparations.

There are two vital advance steps which must be made.

The first has to do with toilets and rest room facilities.



M101 Set has a range from  $\frac{3}{8}$ " to  $2\frac{1}{2}$ ".

No.	Range	Wt.	Price
M0	$\frac{3}{8}$ " to $\frac{1}{2}$ "	3/16	\$4.50
M1	$\frac{1}{2}$ " to 11/16"	$\frac{3}{8}$	5.75
M2	11/16" to 1"	1	7.75
M3	1" to 1-9/16"	2 $\frac{3}{4}$	12.00
M4	1-9/16" to $2\frac{1}{2}$ "	9	22.00
M5B	$2\frac{1}{2}$ " to $3\frac{1}{4}$ "	17 $\frac{1}{4}$	44.50
M5C	$3\frac{1}{4}$ " to 4"	30 $\frac{1}{4}$	44.00
M5S	$3\frac{1}{4}$ " to $4\frac{3}{4}$ "	42 $\frac{1}{4}$	89.00
M6B	4" to $4\frac{3}{4}$ "	38	70.00
M6C	$4\frac{3}{4}$ " to $5\frac{1}{2}$ "	53	76.00
M5	$2\frac{1}{2}$ " to 4"	42 $\frac{1}{2}$	68.50
M6	4" to $5\frac{1}{2}$ "	78	100.00

*Immediate delivery of these sizes  
from stock.*

Write or wire for bulletin M42-11H

**K. O. Lee Company**  
**Aberdeen, South Dakota**

Entirely aside from obvious practical considerations, most states have laws dealing with toilets and rest room facilities for women.

If you are going to employ women, you must install in advance, the necessary plumbing and the necessary rest rooms.

To get these things in time, you must put in your orders in advance, using your priorities to obtain the supplies you need.

You can't do this at the last minute. It takes time to get deliveries. If you are going to start hiring women in December, you must get in your orders for toilets and rest room equipment several weeks before.

The other point is that you must have a woman in your organization, a reasonably mature and experienced woman, capable of handling women's problems on the job, ahead of time, so that when you start to employ women, they will have a woman supervisor to whom they can turn with their particular problems—a woman supervisor who will understand from personal experience the nature of the work to be done and the questions which will arise from the feminine viewpoint.

It is necessary therefore to obtain a woman of this type far in advance of the actual employment of large numbers of women. She should be brought in early, put thru a course of training, with respect to the various operations involved, and made to understand that she is to function in the capacity of what you might call the "Dean of Women" for your organization.

She is not the boss—the foremen and the superintendents are the bosses. But she is the person to whom women can bring any questions dealing with the woman's side of the picture, and she is the person to whom the girls can talk frankly as one woman to another.

I can imagine nothing more disastrous than the situation of a company who, let us say, on December 1st, pub-



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Have you ever benefitted by some resourceful Distributor's *borrowing* of tools or supplies that neither he nor you had in stock on a particular day?

Knowing his territory as he does, the Distributor usually knows what manufacturer has a temporary surplus of what—and can spare a supply until the stock can be replenished.

You *always* need your Industrial Distributor—not just as a telephone number or street address, but as Chief Headache Absorber for your Purchasing-Expediting Department.

Your Distributor is trained to give you a hand on Priorities, too.

Draw on his experience for obtaining the supplies you need. It certainly will be the exception if you don't meet men of your own measure—in fact we are sure they *will* be.

These same Mill Supply Houses have served for many years as this Company's Distributors of Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.



Awarded May 22, 1942

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Awarded August 8, 1942



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lishes an advertisement asking for women to apply for employment and then, when the girls come swarming in, discovers that it has neither adequate toilet nor rest room facilities, nor a woman supervisor capable of handling the women's side of the personnel picture.

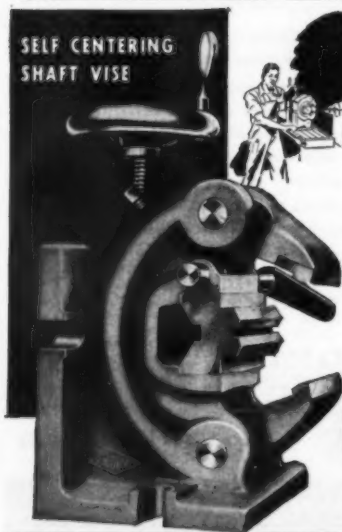
Let me urge you therefore, to take steps immediately with respect to these 2 points: first, the providing of adequate toilet and rest room facilities; second, the employment and training of a woman who will be in a position to act as the supervisor of women on the day when the rank and file of women employees start lining up at the employment office.

After all, it seems to me that the machine tool industry may well step out in the front line in this matter of employing women—because it has been due largely to the accomplishments of the machine tool industry that women can be successfully employed in the war production program.

Owing to machine tool development and design, the machine tool now does the physical work which formerly was done by the operator. The machine tool has within itself the precision and the power needed to get the job done. All that the operator has to do is to have the intelligence and the dexterity to operate the machine. It no longer takes muscle to be a machine tool operator. It takes a certain type of craftsmanship, which the younger generation of Americans have shown that they possess to a very high degree.

To my mind, it seems very natural that the girls of America should be able to learn this craftsmanship just as well and as rapidly as the boys. Since our industry has largely been responsible for eliminating muscle power as a requisite of factory employment, I think we may as well take our medicine, and recognize that on the whole, women can operate machine tools and help build them as well as men.

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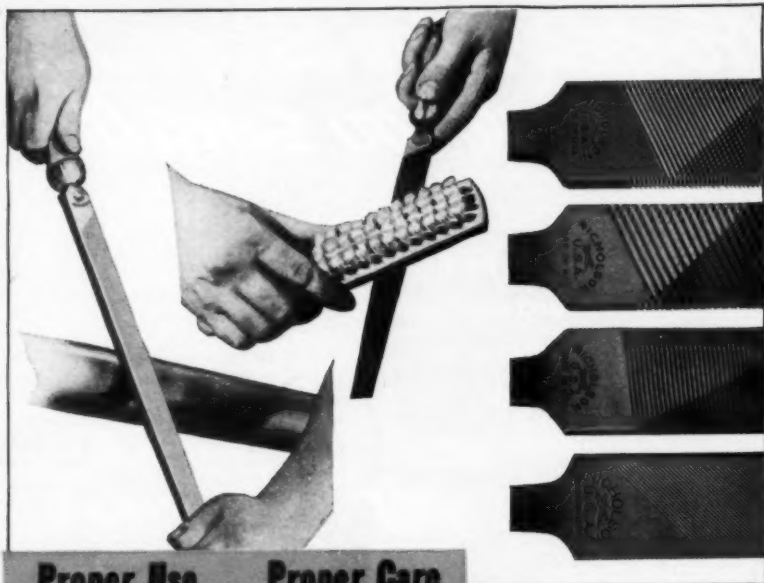
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Superintendents and foremen can do something about it. Posting or circulating

the rules of proper file use and care will help to improve the worker's efficiency, save his time, increase his output, conserve materials, reduce spoiled work, make files themselves last longer (conserving file steels, too).

Nicholson has literature useful as "shop-school texts." Write us on any problem or efficiency program in which our experience with files might be helpful. For your file needs, consult your mill-supply house.

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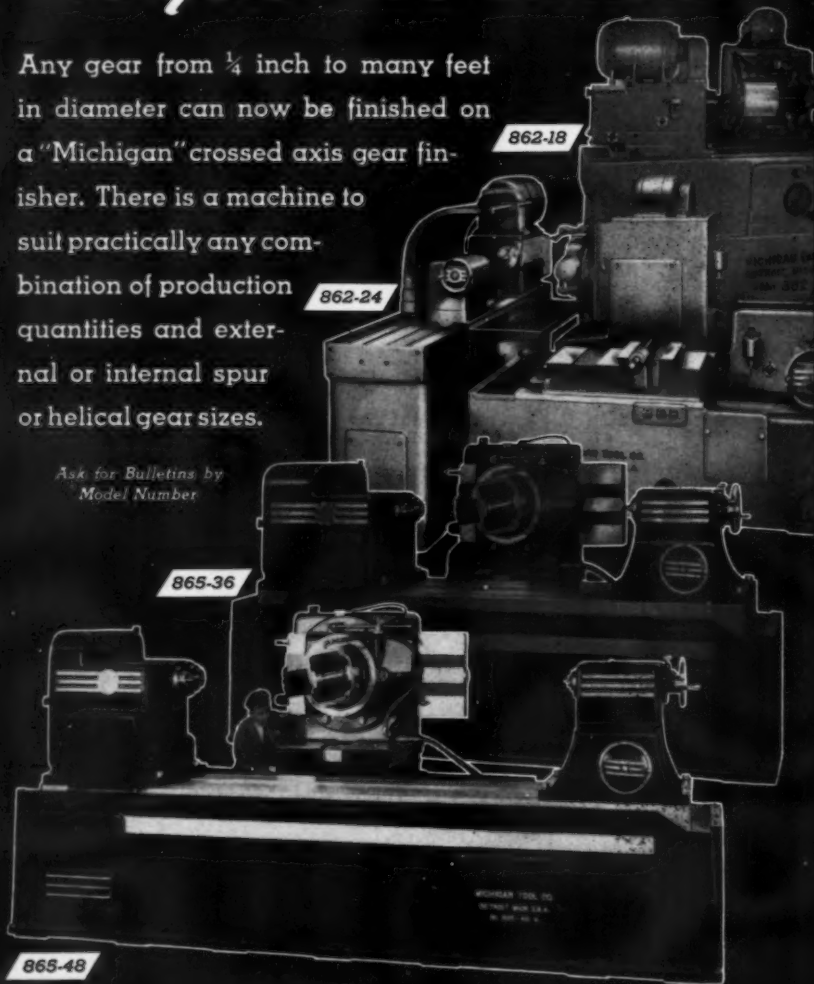
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861-4B (Light Duty)	$\frac{1}{4}$ " to 4"
900 (Rack Type)	1" to 8"
860-(A or B)-8	1" to 8"
860-(A or B)-12	1" to 12"
860-(A or B)-16	1" to 16"
862-18 (Heavy Duty)	$2\frac{1}{4}$ " to 18"
862-24 (Heavy Duty)	$2\frac{1}{4}$ " to 24"
865-36 (Heavy Duty)	4" to 36"
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**IF IT'S A JACOBS \* \* \* — IT HOLDS!**

# Chip Breaker Designs

By W. L. KENNICOTT\*

**O**FTEN, the least careful step in re-conditioning a dull single-point carbide tool is grinding of the chip breaker, yet it is the only step which requires any great degree of precision, the balance of grinding being done "off-hand."

Steel cutting carbide tools operate at such high speeds that a ribbon of steel flowing from the cutting edge is very dangerous. It is sharp, hot, and may become tangled in the work or chuck and whip around the machine. In short, the chip must be coiled or broken in short lengths that will fall away from the tool and work piece.

Three distinct types of ground-in chip breakers are in general use, altho many variations and proportions of each are possible. Each has definite advantages which may or may not suit it to a particular job.

The parallel type breaker (Fig. 3) is a simple step or shelf, ground in the top surface of the tool along the cutting edge and parallel to it. The shoulder thus left behind the cutting edge will have a coiling or crimping action on the chip which flows across it. The chip has a natural tendency to coil upward as it strikes the top surface of a cutting tool, and the parallel type breaker should be wide enough so that the chip has already left the tool surface and started up again before striking the shoulder, otherwise the chip is

crimped too tightly, placing a greater pressure on the tool and promoting cratering and chipping.

There should be a radius at the back of a parallel chip breaker to skid the chip up and over the shoulder (Fig. 1A). A sharp corner will stop the chip, causing it to buckle in the middle, (see Fig. 1B) greatly increasing the pressure on the cutting edge and often flaking off the top surface of the tool behind the shoulder.

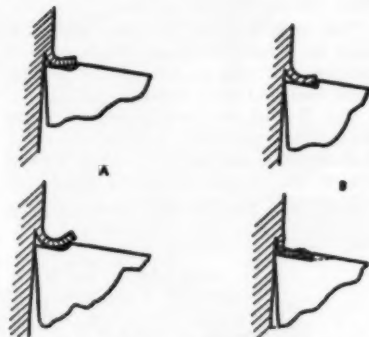


Fig. 1—Designs of chip breaker radii.

The depth of a parallel chip breaker is also of utmost importance. In regrinding a dull tool, the top surface of the tip should be ground down so as to permit regrinding of the chip breaker without deepening it too much (see

\*Tool Engineer, McKenna Metals Co., Latrobe, Pa.

Fig. 2). A deep chip breaker crimps the chip too tightly, causing unnecessary pressure on the cutting edge and frequently fracturing the tip as shown by the dotted line in Fig. 2A.

The second type is the angular chip breaker. It is very similar to the parallel type in cross section, but is ground at an angle to the cutting edge, being narrower at the back of the tip than at the front.

An angular chip breaker, ground in at about 5 to 10 degrees with the side cutting edge has the advantage of running out near the back of the tip, making it unnecessary to grind the steel shank with the diamond chip breaker wheel. This not only increases the life of the diamond wheel, but prevents loading it up and thus permits faster grinding of the carbide.

A greater angle on the chip breaker (10° or over) curls the chip forward toward the unturned shoulder of the work piece, and on shallow cuts will break the chips up into shorter curls than will a parallel breaker.

The angular chip breaker must be used on a fairly constant depth of cut, otherwise it will be too narrow at the back end and may cause trouble.

Fig. 3 and the accompanying table show recommended dimensions for both parallel and angular chip breakers on all common cuts and feeds.

Both the parallel and angular type

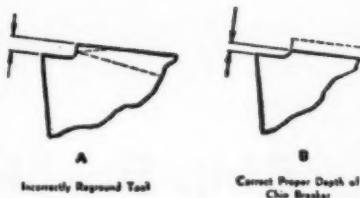


Fig. 2—Proper depth is important.

chip breakers may be modified to give a different rake-angle on the breaker shelf than is provided on the top face of the tip. One of the most common modifications is to grind the breaker in at zero or a slightly negative side rake for use on rough work requiring a very strong cutting edge. Usually between zero and three degrees negative is sufficient to give a blunt included angle of carbide along the cutting edge (see Fig. 4). The tip on such a tool should be set in at zero side rake in order to have sufficient shoulder behind the chip breaker shelf.

Another common modification is to mount the carbide tip at zero side rake and then grind a positive side rake on the chip breaker (Fig. 5). This requires less grinding to get the same height of shoulder (or effective depth of chip breaker) than does the standard angular or parallel type, altho it has a tendency to round the corner of the diamond wheel faster.

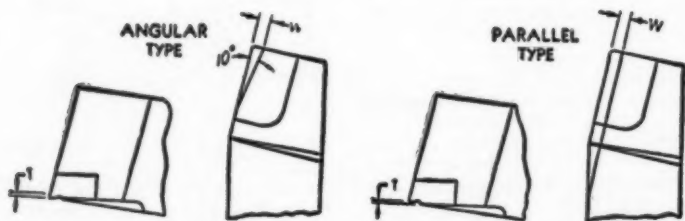


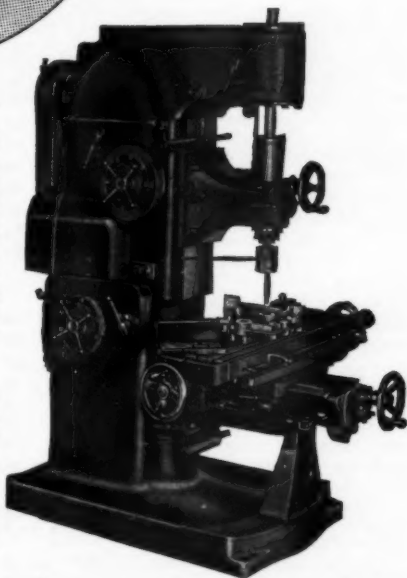
Fig. 3—These illustrations and the table on the following page give recommended dimensions for parallel and angular chip breakers.

# Immediate **DIVIDENDS-**

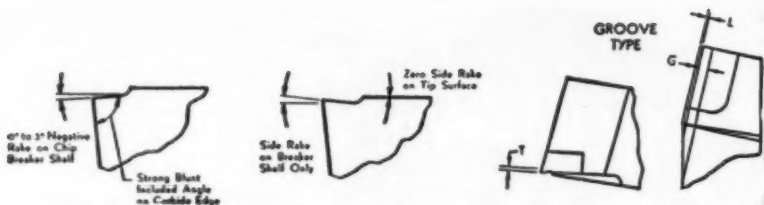
Our All-Out Victory Program demands 24-hour operation at maximum speed. This means sturdy machines that can stand the production pace, like the No. 40 Knight Miller. It is a universal vertical unit that combines the maximum amount of versatility, rigidity, accuracy and speed without sacrificing any one quality for another. It is designed to perform many operations at one setting which ordinarily would require several set-ups and often more than one machine—important considerations when time is so valuable.

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Figures 4, 5 and 6—present the important factor of rake in chip breaker design.

The third general type is the groove chip breaker. This design, like the modified shelf just described, has a side rake ground in the breaker, but is distinctly different in that a narrow flat is ground or honed along the top of the cutting edge, thus removing the breaker from the cutting edge a small amount and making it truly a "groove" in the top of the carbide. The shape of this breaker and the recommended dimensions are shown in Fig. 6 and the accompanying table.

The standard design of groove type chip breaker has the advantage of a greater side rake at the point of contact between chip and carbide, thus reducing the friction between chip and tool, with consequent lessening of tendency to crater. At the same time, the narrow land makes the cutting edge stronger than it would be if the increased side rake extended to the edge.

Further to strengthen the cutting edge, the land may be ground or honed on at zero or slightly negative side rake, since the main chip action is behind the cutting edge a distance ap-

proximately equal to the feed (assuming that the proper speed is used). The fragile cutting edge is thus removed without destroying the positive side rake at point of contact between chip and carbide (see Fig. 7).

On light work or shallow cuts, tool life between grinding often may be increased thru the use of even higher side rakes, (such as 12° on the tool plus 6° in the groove chip breakers, or 18° actual side rake) when combined with the zero or negative land rake to eliminate a fragile edge. Tool wear is reduced due to the extreme side rake, and the cutting edge is sufficiently strong for the light cuts to be taken.

Once chip breaker design and dimensions are found to be satisfactory for a job, the reground tools should be held as close to those dimensions as possible to insure uniform chip conditions. Grinding of chip breakers should be done on a surface grinder or special chip breaker grinder. Resinod bonded diamond wheels only should be used.

#### CHIP BREAKER DIMENSIONS FOR ANGULAR AND PARALLEL TYPES

Depth of Cut	Width W for Feeds of:			
	.006-.012	.013-.017	.018-.027	.028-.035
1/64-3/64	1/16	5/64	7/64	1/8
1/16-1/4	3/32	1/8	5/32	3/16
5/16-1/2	1/8	5/32	3/16	3/16
9/16-3/4	5/32	3/16	3/16	3/16

Thickness T equal to feed up to a maximum of .030".

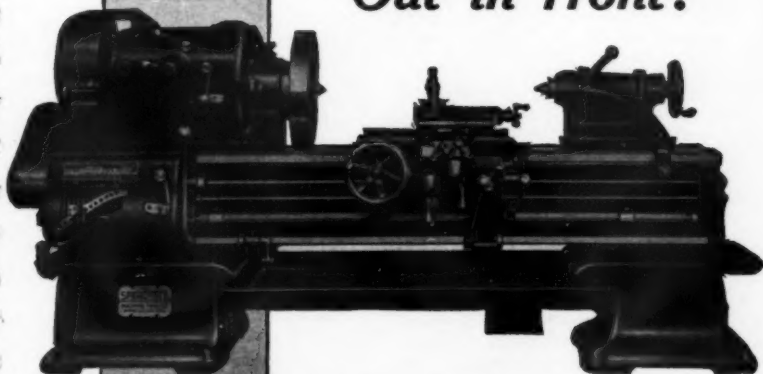
#### CHIP BREAKER DIMENSIONS FOR GROOVE TYPE

G—Groove width to be 3 to 4 times the feed to be used.  
L—Land (parallel to top surface) to be 1 to 1½ times feed to be used.  
T—Thickness or depth of groove to be not over .010".



# S

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Tells the why and  
how of Spring-  
field's accurate  
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**THE SPRINGFIELD MACHINE TOOL CO.**  
SPRINGFIELD OHIO, U. S. A.

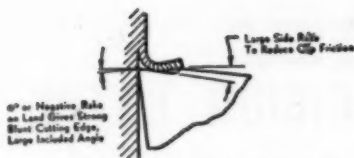


Fig. 7—The cutting edge is removed without destroying the positive side rake at point of contact between chip and carbide.

**Never grind steel-cutting carbides in a rigid vise or magnetic chuck with Silicon Carbide Wheels.**

The tool should be passed rapidly across the wheel, preferably moving the table back and forth by hand as rapidly as possible without tiring the operator's arm. Feed should be NOT OVER A HALF-THOUSANDTH PER PASS, about  $\frac{1}{4}$  to  $\frac{1}{3}$  being ideal. This will assure excellent life from diamond wheels, and grinding will be surprisingly fast and free with the rapid table oscillation.

If steel is ground during part of the stroke, an abrasive stick should be used frequently to free the wheel surface, but grinding steel with a diamond wheel should be avoided wherever possible. The angular chip breaker is helpful in this respect, altho a notch ground in the shank just back of the

tip, or a tip mounted so as to stand somewhat above the top surface of the shank, will permit groove or parallel breakers to be ground without contact between diamond wheel and steel shank.

Tools ground with improper or loaded wheels, or with too great a feed per pass, will tend to develop minute checks or cracks along the cutting edge. These may not be visible, even under a glass, until the tool is put to work. The cracks will then widen and extend farther into the carbide, causing it to crumble along the edge while cutting. These cracks are caused by unequal heating of the carbide, causing the overheated area under the wheel to expand faster than the main body of carbide and develop cracks. (See Fig. 8).

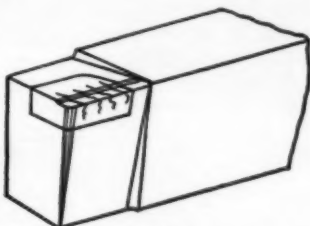


Fig. 8—Cracks caused by unequal heating of the carbide.

Most carbide tools are used with a small nose radius, due to the greater



Fig. 9—Recommendations on the matter of nose radii and the proper designs of chip breakers.

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The Power Bending Brake is indispensable wherever a volume of heavy plate work is to be done. Forms a great variety of bands and shapes, without dies.

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All the main members constructed of rolled steel plate. Equipped with one bull gear inside each end housing. Eccentrics made in one piece with bull gears. Adjusting screws encased in supporting sleeves operate in vertical non-oscillating position. All gearing, eccentrics, ram plungers and ram adjusting worms enclosed in oil.

Ram operates at variable speeds — slow when bending long sheets or fast when forming small pieces. Change of speed is accomplished by turning hand wheel.

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life between grinds, but occasionally a large tool radius is required in order to finish with a radius fillet. When such a tool must be used, the chip breaker becomes more of a problem. If the chip breaker shoulder runs out the front of the tool at a point on the End Cutting Edge Angle, there is no difficulty, but if it runs out at a point on the radius, the cutting edge at that point is irregular and will mar the finish of the work piece, (Fig. 9A) generating excessive heat and dulling rapidly. Widening the chip breaker enough to include a very large nose radius is not practical.

If the depth of cut is small and fairly constant, as is often the case on finish cuts requiring large radius fillets, an angular chip breaker may be ground across at an angle just sufficient to handle the depth of cut, as shown in Fig. 9B. On a deeper cut it is necessary to combine 2 chip breakers, a parallel one to accomplish the chip curling and an angular one to prevent the high point at front of the shoulder from dragging on the work, as shown in Fig. 9C. A large radius will sometimes cause the chip to curl and break without the need of a ground-in breaker of any kind.

Proper chip breaker grinding, in design, procedure, and strict adherence to dimensions once decided upon, has a lot to do with the uniformity of tool performance and getting the most out of carbide tools.

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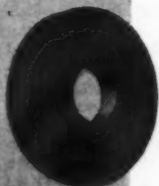
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Today, with high speed tool steels so difficult to obtain, the increase in tool life made possible by refined surface finishes is of tremendous importance.

The high surface finish method is based on the principle that the perfect cutting edge is an **unbroken** line at the junction of two planes, usually forming an acute angle. The line must be unbroken in order to equalize the load placed on the cutting edge and the microscope shows (Fig. 4) that ordinary grinding does not produce such a line.

The accompanying illustrations clearly show why the high surface method increases tool life. In Figures 2 and 3 note the hills and valleys running into each other, not hill to hill and valley to valley, but haphazardly, causing a ragged broken line of peaks and valleys. It is quite ob-

vious what takes place when the tool is put in use, the unsupported peaks are unequal to the heavy load imposed upon them and quickly break off leaving flat spots that rub instead of cut. This places a greater load on the remaining edge which in turn fails quicker than it would if the edge were straight and load equally distributed. In the meantime these flat spots continue to abrade, tearing the stock off instead of giving a smooth clean cut and at the same time generating heat, through this friction, that eventually affects the entire cutting edge and naturally the hardness of the cutter. Net result—a dull tool.



Fig. 1 Finish grinding a cutter with a 320 grain Crystolon wheel.

# ce Finishes on Your Cutting Tool

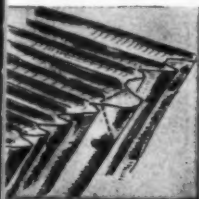


Fig. 2 A cutting edge as ordinarily ground would show "hills" and "valleys" like this under high magnification.

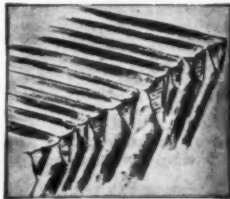


Fig. 3 Note how the "peaks", unequal to the heavy load, break off, quickly dulling the cutting edge.

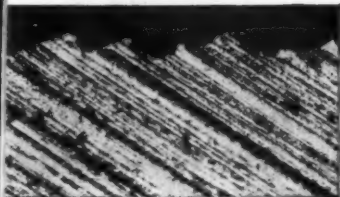


Fig. 4 Edge of cutter as commonly re-ground (100x).



Fig. 5 Same cutter—ground to high surface finish. Elimination of hills and valleys gives keen, long lasting cutting edge. (100x)

answer was to devise an economical method of removing the hills and valleys make the edge as nearly as possible straight unbroken line (Fig. 5). Experts on tool and cutter grinders and supergrinders resulted in the selection of on fine grit Crystolon wheels (37320- or 37320-H8T-4) for cutters and other blade tools. For single point tools an

Alundum vitrified wheel (38220-L9BE) proved most satisfactory. The time and expense of the extra finishing operation (Fig. 1) is more than offset by the increased tool life and improved quality of work produced.

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# The Art of Doweling

Common-sense methods applied to the use of dowel pins.  
Good and bad features explained.

By H. F. WILLIAMS

**I**N these times of National Emergency, when mechanical design should be of the highest efficiency, it is surprising and even distressing to note the flagrant use of, and inconsistent manner in which common dowel pins are applied to jigs, fixtures, and mechanisms for accurately locating guides, plates, locator brackets, aligning strips and other details. Machinists, tool makers and, yes, machine and tool designers are exceedingly lax as to the best locations for placing dowels. This apparent lack of understanding applies not only to the placing of dowel pins, but also to their size, length of contact, type, material, relative hardness and number to be used.

Essentially, the use of dowel pins can be classed into 3 requirements.

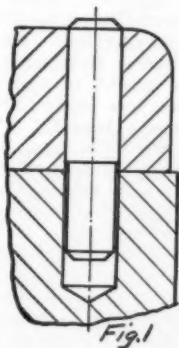
(1) To hold together 2 or more round pieces, as a collar on a shaft where the pin is either pressed or driven into the accommodating hole, being tight in both pieces.

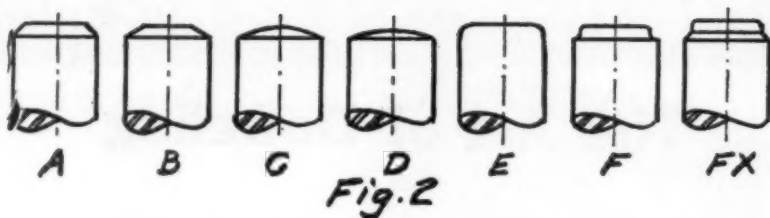
(2) To hold together two or more flat pieces as a locating plate in a jig or fixture, where the pin is pressed tightly into all the pieces held together.

(3) For aligning a bracket, guide or the like, where the dowel is pressed into one number and has an accurate

sliding fit in the other. This may also apply to pieces that must both rotate simultaneously and slide together or apart axially at the same time.

While I am not particularly concerned with the method as in Number 1, it should be noted, however, that when a straight pin is pressed out of a hole, its second application will result in a fit not quite so tight as the first application. Subsequent disassembling and assembling nullify the holding action of the pin, either because the hole is enlarged or the pin is smaller in diameter or both. It is then that the use of a tapered dowel pin is the solution, either in original





design or as a repair, provided of course that the held members are not hardened or at least are soft enough to be taper reamed.

Ordinary straight dowel pins are usually made of cold drawn steel, which, depending on the diameter, is minus 2, 3 or 4 thousandths of an inch. However the stock can be selected so that it is within a maximum of .002". For the use of these plain unfinished dowel pins, the hole is reamed .002" under-size, thereby obtaining a metal-to-metal fit, this being just enough tightness to give a good snug fit. When the nature of the work requires more accurate dowels, the pins can be made of drill rod having a tolerance of plus or minus .0005". To preserve this accuracy, the pins are not hardened, for removal or cleaning of the scale would reduce the diameter enough to give a possible loose fit. When hardened pins are to be specified, larger stock is used and centerless ground after the heat treating operation. One manufacturer of dowel pins makes a precision quality ground to plus or minus .0001". These are made .0002" over-size to assure a snug fit. For repair or removal work, the pins are ground .001" greater than the nominal diameter with the same tolerance.

When one-diameter pin is used, the holes in the 2 pieces to be joined must be of different diameters, especially where they are used for aligning purposes. This necessitates the use of 2 reamers, or an expansion reamer where the size of pin allows. This can

be overcome by the use of a 2-diameter pin as shown exaggerated in Fig. 1. The upper end is ground to the nominal diameter while the lower end is polished down .0002" to .0004" depending on the diameter of the pin. Both holes are reamed to the same diameter. The length of engagement is approximately equal to  $1\frac{1}{2}$  times the diameter. It should be noted that the pin must be polished to such a length that it will not tend to bind in the free hole,  $1/16"$  to  $3/32"$  beyond the joint being sufficient.

Regardless of the type of machine used to make dowel pins, the type of ends must have been previously determined. As in Fig. 2, some of these are chamfered with, or directly after the cutting off tool, to angles of either 45 or 60 degrees, with the axis of the pin as at A and B. Some shop men and designers prefer a rounded end in which the radius of the end is the same or  $1\frac{1}{2}$  times the diameter of the pin, illustrated at C and D. Others like the plain end with rounded edge, commonly called "cheese head" in which the edge is rounded with  $1/32"$  to  $1/16"$  radius at E. The pin is assembled so that height of the radius protrudes from the hole. The special ends of F and FX are used where the mushrooming effect thru pounding or pressing-in is to be absolutely eliminated. These 2 latter types will be discussed.

There are, of course, times when the machinist must use a pin that will be filed flush after assembling and many times he saws off a piece of stock and

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drives it home in the drilled hole. He uses a "tight drill," either one that is a numbered or lettered size drill, or one that has been ground down to suit. In the first place, this is false economy as it takes time to get out a hack saw and cut a small length from a bar. Then too, he wonders why a sloppy fit exists between the hole and the pin. If he must resort to such crude practice, he should at least grind off enough of the burr to form a sort of bevel or chamfer. If a pin is filed or ground off flat and flush with a given surface, it is very difficult to find in case repairs are to be made later. The best method, wherever possible, is to let the pin protrude equal to the height of the chamfered or rounded end. Greater protrusion is better than not enough, because in the latter case a pocket is formed for dirt, oil or chips.

In most instances, the lower end of the pin is shaped identically to the upper end, or may have a combination of any from A to F X. If the latter is true, it is difficult sometimes to get them assembled correctly except when the ends are radically different from each other as in Fig. 3. These ends are used mostly when the dowel or aligning pin leaves the hole entirely as in a die. These ends can be beveled as at G, H and J to an included angle of 120, 90 or 60 degrees, or in fact any other angle that converges into the rounded point. Note also that the junction of the straight and beveled

surfaces is rounded, which is quite important. At K and L, the ends are rounded to radii of  $\frac{3}{4}$  and  $\frac{1}{2}$  the diameter of the pin. The edge between the radius and the main body of the pin K should be rounded.

At M, end of the pin is tapered to an included angle of 6 to 10 degrees and to a length equal to break the corner. The point at N is known as "acorn" and is used many times in jig fixture and die assemblies. It has excellent aligning features. The end illustrated at P is so shaped as to engage the hole gradually from one side until its entire periphery fits the hole. The end at R of 60 degrees included, is sometimes used for both ends, being similar to A and B in Fig. 1.

And now, as to the location of the dowel pins in any type of mechanism, it can be stated generally that they should be as far apart as consistently possible. In Fig. 4 is shown the wrong way to position dowel pins. While the spacing of all the holes makes a pleasing geometrical and symmetrical design, the dowel pins are too close together.

In Fig. 5, the design is better in that the dowels are apparently as far apart as they can be. But upon investigation as to the holding power of the hollow or socket head screws, there is no reason why the dowels cannot be placed outside the screws as in Fig. 6. Here they are as far apart as possible. It might be wondered why the dowels in Fig. 4 are not placed at X-X. In this case it is difficult many times to so position them because of design condi-

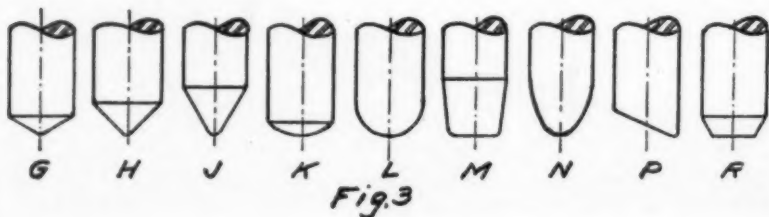


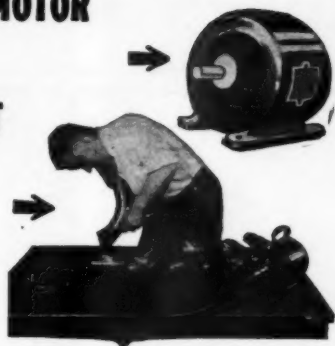
Fig. 3

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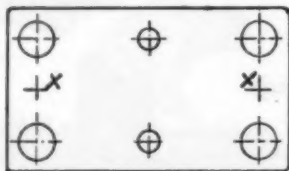
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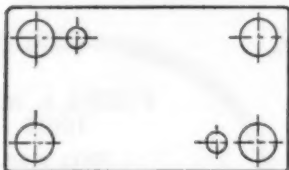
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tions. If this could be done, the pins would be sufficiently far apart for all practical reasons.

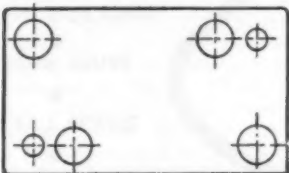
In Fig. 7, the designer foolishly positioned 3 screws and 2 dowels as shown.



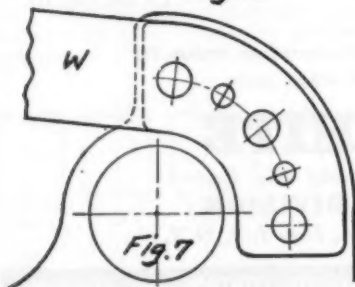
*Fig. 4*



*Fig. 5*



*Fig. 6*



*Fig. 7*

The arm W extended some distance from its base but performed the duty only of holding an indicator; consequently there was little or no load on the arm. Its own weight was negligible. How much better it would have been to place the dowels where the outer screws are, and to use but 2 screws where the dowel pins are.

The diameters of the dowel pins used in many installations are extremely small when compared with the size of the holding screws. This is further exaggerated because the heads of the screws show, and the heads are, of course, considerably larger than the bodies of the screws. Some designers follow the rule that the pin diameter should be equal to the diameter of the screw. This, however, seems quite large so that the approximate root diameter of the screw is recommended as the minimum diameter of the pin. Therefore for a  $\frac{1}{2}$ -13 screw, the pin diameter might be  $\frac{3}{8}$  or  $\frac{7}{16}$ ". A pin of  $\frac{3}{16}$  or  $\frac{1}{4}$ " diameter should be avoided in such a combination.

The placing of these pins as far apart as possible should be done with some discretion. It is just as bad to get them too far apart as too close together, in that enough metal should be left between the periphery of the pin and the edge of the work. A good rule to follow is that this space should be equal at least to the diameter of the pin. Then there will be no possibility of this metal cracking when the pin is driven in at assembly. Many times the pins are so placed as to line up with the screws in both directions. The distance between the dowel pin and screw holes should be at least equal to the diameter of the pin but this will be determined to a great extent, especially if the pieces are jig drilled, by the diameters of the fixed and slip drill bushings.

The length of engagement of the dowel pin has been recommended vari-



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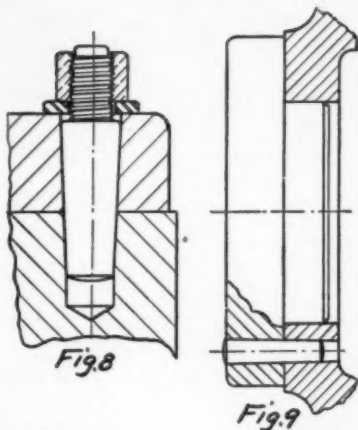
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ously, as from once to twice the diameter. Some even go farther than that by specifying  $2\frac{1}{2}$  times the diameter. The common sense solution would seem to depend upon the application. In many instances the parts would become very heavy if twice the diameter were to be followed. In other cases the parts are so thin that once the diameter is sufficient. As good an average as any is approximately  $1\frac{1}{2}$  times the diameter but here also conditions will dictate what is proper.

One of the unforgivable errors is to drive a dowel pin into a blind hole, where no means are provided for its removal. The expression is often heard:—"Oh well, let them drill it out." If it were realized what grief such "drilling out" brings, this practice would be abolished. It seems that a designer or shop man has to make this mistake at least once in his lifetime before he learns. Thereafter he shuns it like poison ivy. However, there are



also those who drill a small hole thru "to let out air" but fail to see why it is impossible to drive out a  $\frac{1}{2}$ " pin with a  $\frac{1}{4}$ " rod. Of course, the rule is—"Always drill a thru hole." That

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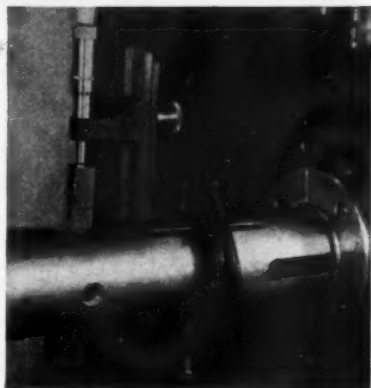
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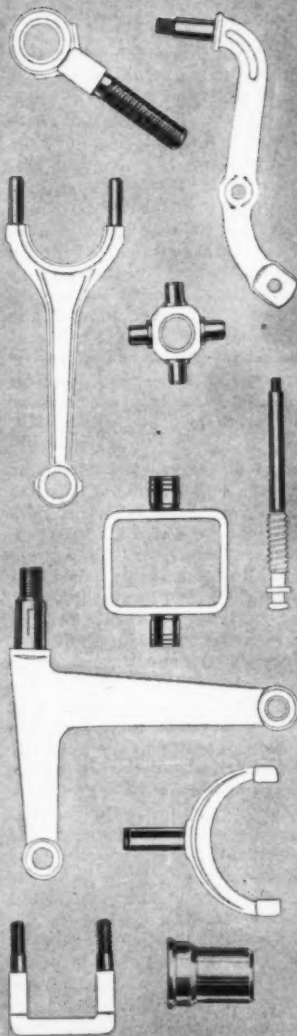


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does not mean a "thru hole" that terminates partly in a rib, brace or wall, but one into which an honest-to-goodness rod can be inserted and with plenty of room to swing a hammer.

As stated in the beginning of this article, there are times when a straight dowel pin has to be assembled and disassembled so frequently that it loses its efficiency. In such cases, use of taper pins is advisable. Because the common taper pin, having a taper of  $\frac{1}{4}^{\circ}$  to the foot is so well known, and because the May 1940 issue of The Machine Tool Blue Book contained an article by me on Taper Pin Applications, I shall discuss only one type of taper pin used for aligning in this article.

The design of the tapered dowel pin shown in Fig. 8 is by no means new, having been used in heavy machinery installations for years. However it is not limited to large applications but any size of the taper pin can be used. Its application is in locations where it cannot be driven out readily for disassembly purposes because of the inaccessability to the small end. This indicates, of course, that such a design of tapered dowel is used either in a blind hole or at some inner position of a mechanism. It is driven tightly into both members and is used where positive alignment must be maintained. For smaller work, an ordinary purchased taper pin can be chucked and turned down at the upper end to a standard screw diameter or can be threaded directly. In this instance it is used in the soft state. When the pin is larger, especially when needed in heavy work, it should be made of an alloy steel heat treated and accurately ground. A low carbon steel such as screw stock is sometimes used, case carburized approximately .050 to .060" deep and taper ground.

For the sake of utility, the threaded portion must necessarily extend above

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Detroit, Michigan

Gentlemen: Please send me additional information on Mid-West Micro Bond honing and superfinishing stones.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_

the assembled parts. It is the only way that it can be drawn from the hole. Some designers and shop men do not like it because of its appearance and its shortcomings in the way of being "fool proof." The threaded portion is for the application of a hexagon check nut when withdrawing the pin. Should the operator give the machine a general "tightening up," there is a possibility that the hexagon nut might be given a twist, thereby loosening the pin and disturbing the alignment. For this reason, as shown in the sketch, a round threaded sleeve is screwed over the threads, mostly for protection. Where the machine is heavy enough so there is little or no vibration, and especially when the pin is used in a vertical position, all that is necessary is a piece of pipe or tubing cut to length and placed over the threaded part. The upper end is relieved to a diameter below

the root diameter of the thread to guard against peering over when it is being driven into place, and is shaped like the ends shown at F and FX in Fig. 3. The washer may or may not be necessary. All sharp corners on the pin are rounded.

Regardless of the type of dowel pin used, whether straight or tapered, on most installations the use of 2 pins will suffice. However there are also instances where only one is necessary as illustrated in Fig. 9. How many times do we see 2 pins in such design where the second pin is superfluous? Here the pilot acts as one dowel, the pin itself preventing rotation. There are also other instances where one dowel pin only is necessary i.e., where a lip or guide strip is used to locate a piece of mechanism. In this case the pin need only prevent end movement.

### J. & L. Ships 1,000th Automatic Thread Grinder



Appropriate ceremonies marked shipment from the Jones & Lamson plant of this sturdy, capable machine to join its 999 brothers on the vital war-production front. Left to right in the picture are: Ralph E. Flanders, Pres.; Ernest V. Flanders, Mgr., Thread Grinder Dept.; Lee Davis, Engineer, and Walter Grimm, Mgr., Thread Tool Div.



# THE Bridgeport TURRET MILLING MACHINE

**Rigidity and  
Flexibility  
Unparalleled  
Range**

The most difficult milling, drilling and boring jobs are easy with the new Bridgeport. Here are a few of the advanced modern features that make such performance possible.

Angular settings in one plane are achieved by turning the hand wheel which controls the keyed overarm. Turret diameter is 15" with 5" overarm.

Column, knee and table construction are rugged with wide ways and taper gibs for accurate and vibrationless operation. Table, knee and saddle locks are located in front for easy accessibility.

Graduated dials are  $3\frac{1}{4}$ " in diameter. Anti-friction bearings are used throughout.

*Write for full details.*

**BRIDGEPORT MACHINES, INC.**  
52 REMER ST. BRIDGEPORT, CONN.

# SEE THE HACK

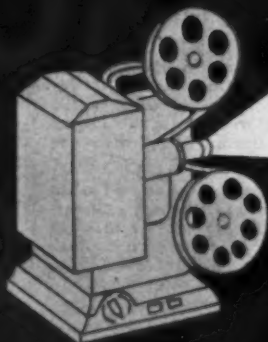
**WHY IS IT MUCH CHEAPER TO CONVERT THE HACK MULTI-VERSAL THAN TO TRANSFER WORK FROM MACHINE TO MACHINE AS FORMERLY DONE ?**

The answer is fully presented in colored moving pictures—right in your own plant if you wish, or at your dealers show room.

You can see then for yourself why this modern production aid performs 30 precision cutting operations efficiently, eliminating needless steps—saving time otherwise wasted.

See this unique machine handle tough and unusual jobs, reducing set-ups per piece part, handling medium heavy, or small work with equal despatch.

The simplicity and versatility of the Hack Multi-Versal permits you to do a multiplicity of operations on a part with one setting.

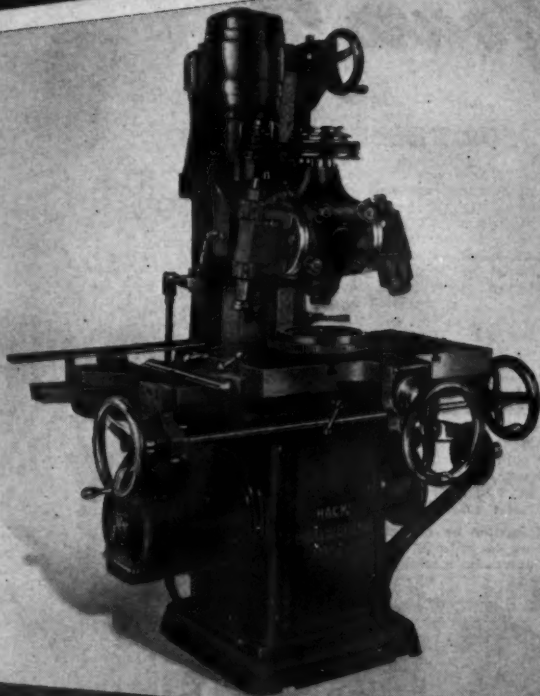


## HACK MACHINE CO.

DES PLAINES, ILL.

# KMULTI-VERSAL

## IN YOUR OWN PLANT



MAIL THE COUPON—TODAY!

**HACK MACHINE CO., Des Plaines, Ill.**

Date.....

We desire additional information on your equipment as suited to our needs. ☐

We are interested in seeing your movie film portraying operation of this unit ☐

We do have a man ☐ } Qualified to operate a Projector  
do not have a man ☐

We have ☐ } a 16 mm Projector  
do not have ☐

We have ☐ } a 12" phonograph record player  
do not have ☐

We would like to interview your factory representative or dealer ☐

Name..... Firm.....

Address..... City and State.....

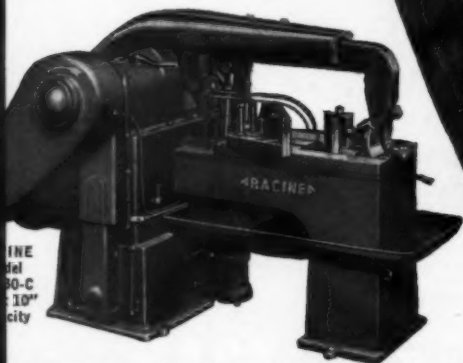
# WHICH CUT *is Yours?*

## TRUE... OR FALSE?

Stepping up production needs more than just speeding up the sawing in your cut off department. Your production line can not save the time gained by sawing stock faster without receiving smooth accurately cut pieces... each piece to the correct machining length. Machining down crooked cuts will waste valuable time and add critical metals to your scrap pile.

RACINE Heavy Duty Hydraulic Saws are precision designed to cut accurately at high speeds. Each machine has a massive saw guide to tension the saw blade. Wide bearing areas contained in the saw frame provide rigid alignment under heavy cutting feeds to maintain accuracy in cutting material from 10" x 16" up to 14" x 20". Such accuracy means safer, faster cutting.

Write for information on our complete line, 6" x 6" up to 14" x 20" and also on our fully automatic machines.



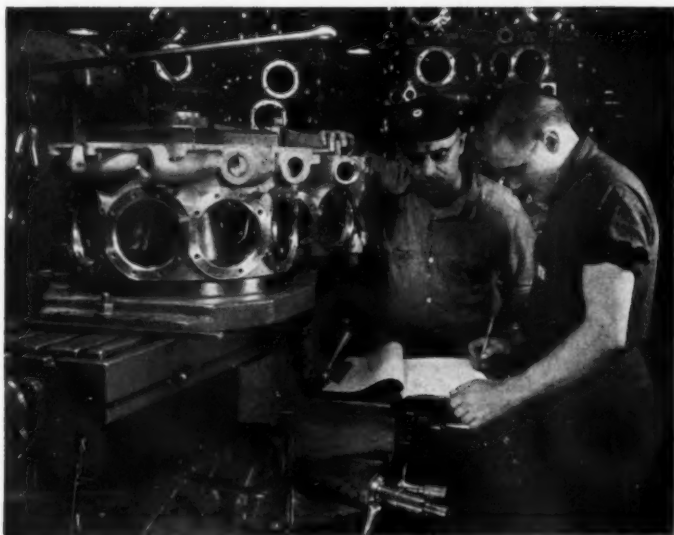
LINE  
del  
90-C  
10"  
city

RACINE TOOL & MACHINE CO., 1754 State St., Racine, Wisconsin

# RACINE

## METAL CUTTING MACHINES





A new machine tool hand at the Aviation Corporation's Lycoming Division Plant, Williamsport, Pa., getting some pointers from an old-timer on filling out his machine tool operator's questionnaire. Altho new men are asked to write out the answers at home, they are encouraged to seek information while on the job at the plant.

## Testing New Tool Operators

**H**OW much should a new machine tool operator know about his work after he is on the job a few weeks?

And how can a company determine if a new man meets the minimum standard?

In normal times these questions just aren't a problem. A good foreman can pretty well size up a green hand after spending some little time with him. But in the present expansion period, a foreman isn't able to spend much individual time with all his new men, and there are so many green hands to be

considered. It is important that some standards be established for checking up on all of them.

In this connection, a series of written questionnaires for job-testing developed by the personnel department of the Lycoming Division of The Aviation Corp., Williamsport, Pa., is attracting considerable interest.

Lycoming, manufacturer of radial and horizontally-opposed airplane engines, has almost quadrupled its shop personnel in the last 2 years, and is still expanding. Breaking-in new ma-

chine tool operators, the company has adopted the widely-used plan of assigning a new hand to the machine of an older, experienced operator under whose supervision the new man gradually takes over. In a few days or a few weeks, the novice, who is usually a graduate of the Williamsport Technical Institute (the local public vocational school) is able to handle the machine entirely on his own and is then generally transferred to the second or third shift.

The company makes sure, however, that before the new man is put in full charge of a machine, he satisfactorily answers a written questionnaire about that particular machine. The questionnaire consists of three parts:—

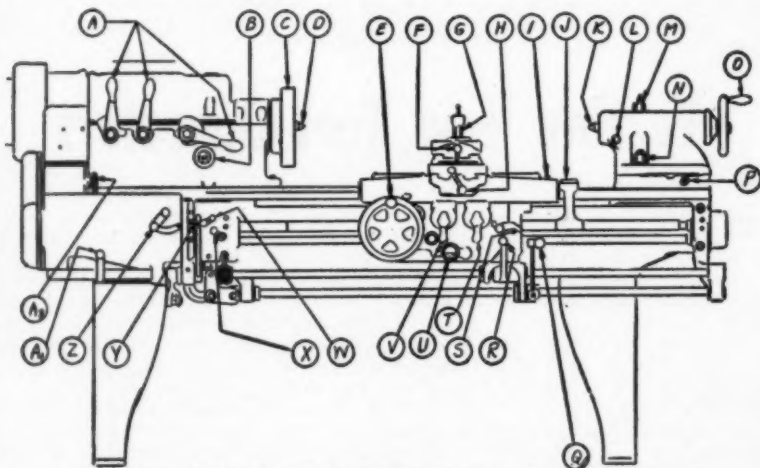
(1) A drawing (or, in some cases, several drawings) of the machine with arrows pointing to all the important levers, wheels, buttons, and other controls. The operator must name and explain the use of all these controls, proper space being provided on several

sheets of the questionnaire for the answers.

(2) A series of 15 to 30 questions (depending upon the complexity of the machine) about its operation, such as the setting of the cutters, selection of spindle speeds, use of hand adjustments, the handling of chucks and arbors, lubrication, etc.

(3) A series of 14 questions (standard for all operators) on general shop practice. Typical questions here are:—What would you do in case of an oil fire? Who should be the first one to know of a mistake made or discovered by you? How often should your gages and micrometers be checked?

The questionnaire is given the new man within a few days after he first goes to work and he is asked to fill it out at home. Some questions can be answered in a single word, others take a paragraph. Many require the operator to use initiative—he must find the department foreman for some answers, look up the machine manufacturer's



Lodge & Shipley 12"—14"—16" Engine Lathe Questions:—Name and explain the uses of all controls lettered on this sketch.

# SHARP-TOOLS

**IN A HURRY!**

**AT LOWEST COST**

**WITH TOP-MOST ACCURACY AND SPEED**



## **HILCO** UNIVERSAL **CUTTER-GRINDER**

**EXCLUSIVE, PATENTED  
HILCO INDEX  
DIVIDING HEAD**

(No other grinder has it.)  
Permits fast set-up of any conceivable angle — grinds any type cutter to perfect uniformity.

Keep all your cutting tools always sharp! Keep production at top pace! Avoid "dull tool" delays and losses! The HILCO Universal Cutter-Grinder will sharpen your tools in a fraction of the time required by any other type grinder. No costly set-ups—no waiting—utmost flexibility—low initial cost, only \$495.00—lowest operating cost. Revolutionary in design and operation.

WRITE FOR CATALOG

**BERCO MANUFACTURING CO.**

423 WEST SUPERIOR ST.  
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manual for others, and generally ask his instructor and foreman quite a number of questions.

Lycoming people feel that the questionnaire serves a number of useful purposes. For one thing, it establishes a minimum standard for new hands, making certain that operators of general-purpose machines aren't "one-operation" mechanics. Too often, it is felt, some operators, never learning the purpose of all the controls, fail to get out of a machine anywhere near all the efficiency that is built into it. On the other hand an operator who is familiar with all his controls is likely to use them.

The questionnaire also provides the green hand with a guide for learning. He finds out by this means what the company expects him to learn about his machine, what the company considers important. And he knows what questions to ask. In the same way it makes certain that the older operator-instructor doesn't hold back any important information. Very little of this attitude still exists today, but there sometimes is a tendency on the part of older men to limit their help to new men for fear the younger men will get their jobs.

The questionnaire is further considered valuable in that it goes far to determine a man's interest in his job. And it points out outstanding men, also men who have unusual ability in certain other types of work, and those of lesser ability who need help. This shows up in the way a man answers the questions, his thoroughness, the sketches he makes, how promptly he returns his papers, and so on.

Sometimes shy and backward men, for example, who don't sell themselves as well as they might in personal interviews are shown to have unusual ability, while on occasion others who can talk persuasively are shown to be less experienced or gifted mechanically than they supposed.

In this connection, the company points out that the new man is not rated solely on this paper work. The questionnaire is simply a supplementary means of evaluating him—tho a rather useful one. Certainly, in cases where the instructor and foreman are undecided about a new man, the questionnaire is very helpful.

Lycoming has already given the test to hundreds of men. With the help of their most experienced old hands and the cooperation of the builders of the various machines, the company has developed questionnaires on the operation and setup of some 60 different standard machine tools. These include everything from simple single-spindle drill presses to thread grinders, 6-spindle automatic screw machines and specially-designed horizontal multiple-drilling machines.

## Lycoming's Test Questions

### To New Employees:

You have been employed by Lycoming Division, The Aviation Corp., in the hope that you will become a good employee.

You have been placed with an experienced operator who will be glad to assist you whenever possible and to teach you what he has learned from much experience.

However, you must do your part. Your progress will depend entirely upon your own efforts. The following sheets should help to point out what you must learn in order to do your job well.

Try to write out the answers to these questions at home.  
(General Questions for all Operators:)

---

Employee's Name

Leave the machine for the next fellow as you would have him leave it for you.  
Directions: — Find out and write answers to the following questions. It

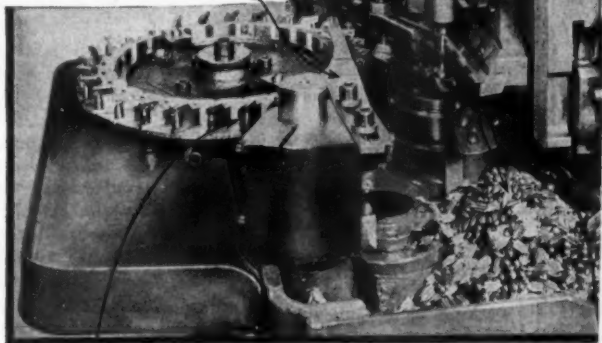
# NEW LOWER COSTS on Small Gear Production

**Fellows Straight-Line Gear Generator  
beats performance of sub-press dies.**



**SAMPLES OF WORK** which  
can be automatically  
magazine loaded and cut to  
a high degree of accuracy  
on a high-production basis.

Work is automatically transferred  
and clamped for cutting



Blanks are loaded here

Work automatically

**THE NEW FELLOWS STRAIGHT-LINE GEAR GENERATOR** will produce tiny pinions, gears from thin blanks ganged on arbors, and other parts of delicate and intricate shape at revolutionary high rates of production. Cutter speeds up to 1500 strokes per minute, and automatic magazine loading, open up new avenues of economy in precision gear manufacture. The rack-type cutter can be ground to any desired tooth shape, and to the most exacting fine-pitch requirements . . . Other features of special interest to those making small fine-pitch gears are fully covered in a new Bulletin which will be mailed upon request.



**THE FELLOWS GEAR SHAPE  
COMPANY**

1000 N. Dearborn Ave., Chicago, Illinois — 616 Fisher Building, Detroit, Mich.

is suggested that you write out the answers at home.

- (1) What would you do in case of an oil fire?
- (2) What would you do in case of a magnesium fire?
- (3) What would you do in case of an electric fire?
- (4) What would you do in the case of paper fire?
- (5) What precautions should be exercised in the use of an air hose?
- (6) What do you do in case of an injury to yourself, no matter how slight?
- (7) What precautions should you take before starting on a job left by someone else?
- (8) Who should be the first one to know of a mistake made or discovered by you?
- (9) What precautions should be taken when working in the vicinity of flying particles?
- (10) What would you do if a fellow workman receives an electric shock and cannot leave go while working at his machine?
- (11) What would you do if a fellow workman becomes caught in his machine?
- (12) When do you use gages provided for the job?
- (13) When do you use micrometers of the various types?
- (14) How often should your gages and micrometers be checked?
- (6) For what is the steadyrest used?
- (7) How do you set the taper attachment?
- (8) What precaution should be taken when running work between centers?
- (9) If when running work between centers, your work is tapered, what would you check?
- (10) Name 3 types tool bits in reference to the material of which they are made.
- (11) For what are these tools used?
- (12) What precaution must be taken in the use of carboly tools?
- (13) What is meant by rake?
- (14) What is meant by clearance?
- (15) Where should the tool generally be set?
- (16) What causes chatter?
- (17) What governs the feeds and speeds at which you run?
- (18) What is the necessity of using sharp tools on magnesium?
- (19) What is meant by honing a tool?
- (20) Why is a tool honed?

#### Operation Questions.

Directions:—Find out and write answers to the following questions. It is suggested that you write out the answers at home.

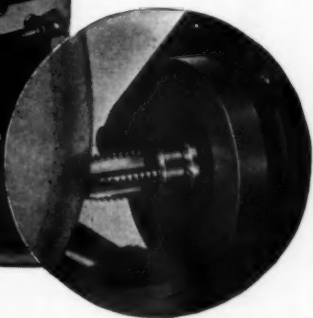
- (1) How do you start your machine?
- (2) How do you stop your machine?
- (3) How do you change feeds?
- (4) How do you change speeds?
- (5) Explain fully the oiling of your machine.



Drawn for the Office of War Information



Photo below shows  
tap held in Blake  
bushing



## GET UP TO 10 TIMES MORE HOLES PER TAP

*By sharpening them on the* **BLAKE TAP GRINDER**

The Blake Tap Grinder has shown that the practice of throwing away dull taps is extremely wasteful. In these days of war production, a continuation of this practice is almost criminal.

Why scrap dull taps when the Blake assures you of at least double the number of tapped holes, and in most cases will increase them ten times?

The Blake will grind the chamfer on right-or left-hand taps with 2, 3, 4, 5, 6, 8 and 10 flutes. Capacity—No. 0 to 2". Additional profits and production may be had by sharpening countersinks and other small tools on the Blake Tap Grinder. (Formerly called the J-B Tap Grinder).

### COUPON

Please send folder giving complete details  
on the Blake Tap Grinder.

NAME.....TITLE.....

COMPANY.....

STREET.....

CITY.....STATE.....

H

## EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

J-B TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS

Arnold Schwann & Co.  
 Augusta Arsenal  
 Automatic Sprinkler Co. of Am.  
 Bendix Aviation Corp.  
 Burgess Battery Corp.  
 Cessna Aircraft Corp.  
 Champion Dishwashing Co.  
 Chicago, Rock Island & Pacific  
 R. R. Co.  
 Chicago Screw Company  
 Combustion Engineering Co.  
 Congoleum Nairn, Inc.  
 Dechler Die Casting Co.  
 Driver Harris Co.  
 Electric Auto-Lite Co.  
 Fosterite Screw Products Co.  
 Frankfurt Arsenal  
 Frisco Lines  
 Harrell Industries  
 Imperial Brass Mfg. Co.  
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 Kohler Corp.  
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 Lion Mfg. Co.  
 Missouri Pacific R. R. Co.  
 Monsanto Chemical Co.  
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 Ohio Pattern and Fdry. Co.  
 Onida, Ltd.  
 Pennsylvania Railroad  
 Perth Amboy Dry Dock Co.  
 Ponoma Pump Co.  
 Proctor & Gamble Co.  
 Republic Steel Corporation  
 Reverse Copper and Brass, Inc.  
 SKF Industries  
 Sullivan Dry Dock Co.  
 Thos. A. Edison Co.  
 The Tinkon-Detroit Axle Co.  
 Toledo Scale Co.  
 The Todd Company  
 Wabash Railway Co.  
 Wagner Electric Co.

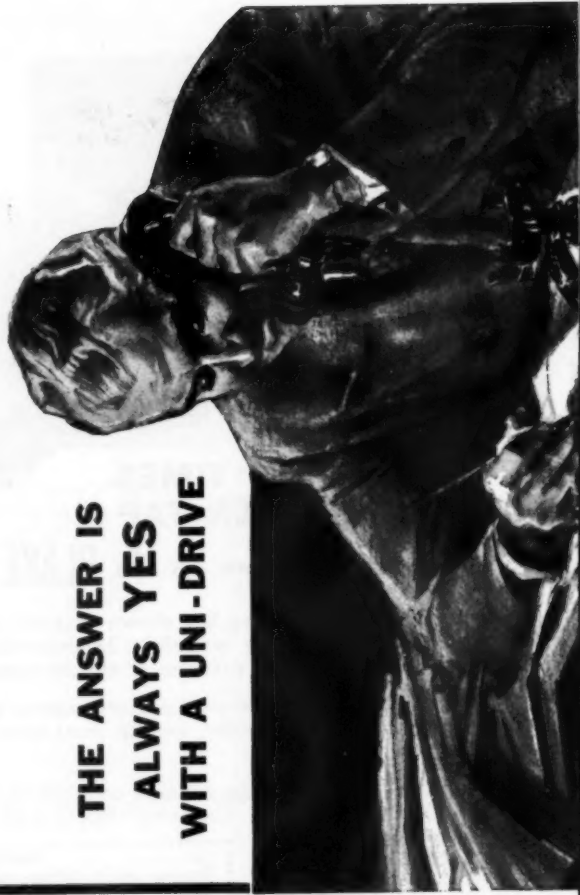
( DEALERS: Write for full details about  
 this fast-moving line for your territory. )

## THE TURNER UNI-DRIVE COMPANY

(Sales Division: Turner Machinery Co.)

3416 Terrace Street Kansas City, Mo.

THE ANSWER IS  
 ALWAYS YES  
 WITH A UNI-DRIVE





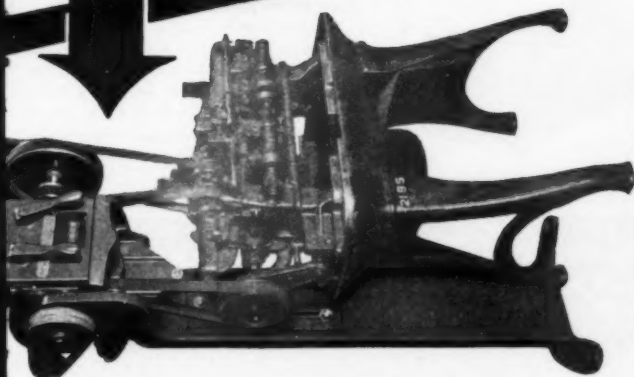
# ENCASED, HERE, IS THE

# MAGIC OF THE

# TURNER

# UNI-DRIVE

Motorizes Machine Tools



HERE'S *proved, dependable* aid in stepping up and keeping your production at full speed . . . the **TURNER UNI-DRIVE**. In many of America's largest plants this *successful* motor drive is speeding production, saving labor and time, cutting power costs. So sure are we that it will prove a big aid in your business that we guarantee Uni-Drives for one year—subject to return for full credit within 60 days if not satisfactory.

**UNI-DRIVE** eliminates overhead counter shafts. No belts to shift. Increased efficiency of machine and operator. Installed in 2 to 4 hours. All the advantages of geared head with belt drive smoothness. Big saving in power. Sizes  $\frac{1}{4}$  to 20 H. P.

*Investigate . . . and be convinced!* See your dealer at once, or write us for full information and prices.

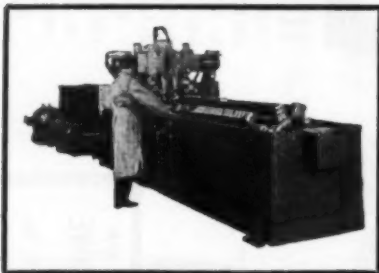
**SOME USERS OF  
TURNER UNI-DRIVE**

American Brake Shoe & F. Co.  
Kellogg Division  
Southern Wheel Division

# 6 BROACHING OPERATIONS *with* 1 MACHINE SET-UP...



## ... ON 75 MM CANNON BREECH BLOCK



\* \* \* "Somewhere in the Middle West", a mammoth gun plant is producing breech blocks for 75 MM Cannon with the aid of the special AMERICAN broaching machine shown to the left.

The revolving broach handling cradle can be seen to the front of the machine. This machine facilitates broaching one of the large breech blocks while another is being loaded on the opposite side of the special fixture. Compared to machining these blocks by conventional methods, production obtained is very high.

**A** AMERICAN BROACH & MACHINE COMPANY  
ANN ARBOR, MICHIGAN, U. S. A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY



# Models Speed War Production

By H. E. CHESEBRO\*

The job of reading a drawing and thoroly visualizing a piece of complicated apparatus in completed form is sometimes difficult, even for the technically trained man, and for this reason the model can play a real part in speeding up production. Models have a 3-dimensional advantage over a drawing. They are being used by General Electric, not only to facilitate understanding of apparatus to be built, but to work out problems in design as well.

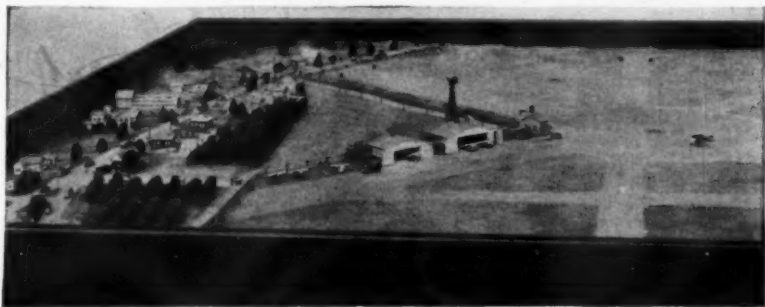
For example, under construction now is a model representing in miniature a new type power plant. The actual plant, when completed, will represent a compact and ingenious assembly of power generating equipment. The model is being constructed to the scale

of 1-inch to the foot. It will afford an easy and sure means of checking the correct arrangement of equipment in the actual unit.

The preliminary steps in getting the power plant model underway are typical of those for most models. First of all, scale drawings for the model were made from drawings for the actual unit and its apparatus; 2nd, a breakdown of the drawing into its logical sections and parts was made; 3d, the materials to be used for each of the various parts was decided upon, and work was begun.

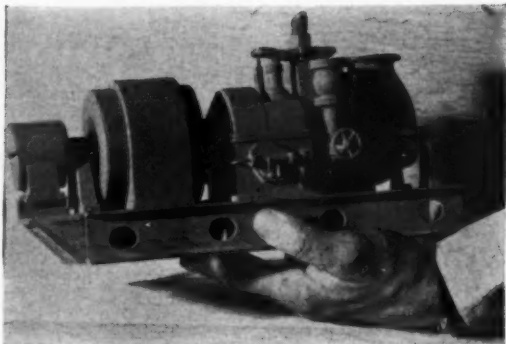
Materials of which models are constructed vary. Clear white pine is usually best for the wood-carved and

\*General Electric Co., Schenectady, N. Y.



Model used to demonstrate airport lighting. Landing and limit lights around port light realistically and the beacon revolves automatically.

Closeup of model of auxiliary set for a powerplant. Cover the hand and the model could pass for the real thing life size.



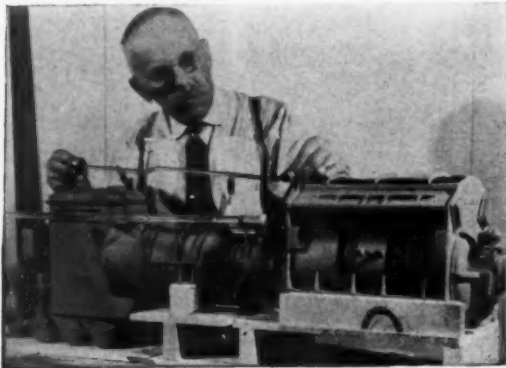
built-up pieces. Maple generally works out better for wood turnings. Brass and galvanized iron are usually the most workable for structural members. White metal and aluminum are most frequently preferred for the cast pieces.

Since work is done in both wood and metal, it is necessary to have a complete set of pattern-making tools for wood working, and a fairly complete set of machinist tools to finish the metal parts and castings. The machinery in our Model Department consists of a lathe for wood working and a lathe for metal working; a metal-bending brake; sanders (belt, disk, and cy-

lindrical); a drill press, a circular saw; a band saw; a jointer planer; a gas torch; and a small hand grinder for carving and roughing wood or metal. We also have a gas furnace capable of heating aluminum and other soft metals; some small casting flasks; a few molder's tools; and a small spraying outfit for painting the models.

In many cases, apparatus models are made entirely of wood. Most of them are hand carved, using the hand grinder with small detachable burrs and sanders.

When it is necessary to show interior views of machines or apparatus,



Models like this one on which the author is working, are a real help in speeding production at General Electric. This scale model of a steam turbine generator affords engineers an excellent means of verifying their designs for a new powerplant, thus minimizing chance of error before construction of the actual plant begins.

# Practical Boring to Limits Like This:

**$\pm .0002''$   $-.0001''$**

## PRECISION BORING DATA

**PART**—End Bracket.

**MATERIAL**—Cast Aluminum with 1020 Steel Insert.

**HOLDING METHOD**—Special Fixture.

**LOCATION**—On Rabbit Fit Dia.

**MACHINE**—#200 Simplex Precision Boring Machine.

**OPERATION**—Bore 1.0230" Dia. Hole.

**TOLERANCES**— $\pm .0002''$   
 $-.0001''$ .

**FEED**— $1\frac{1}{2}''$  per Minute.

**SPEED**—1150 r.p.m.

**FLOOR-TO-FLOOR TIME**—4 Minutes, including inspection time.

## SIMPLEX UNIT-TYPE BORING MACHINES OFFER *Precision, Versatility and Speed*

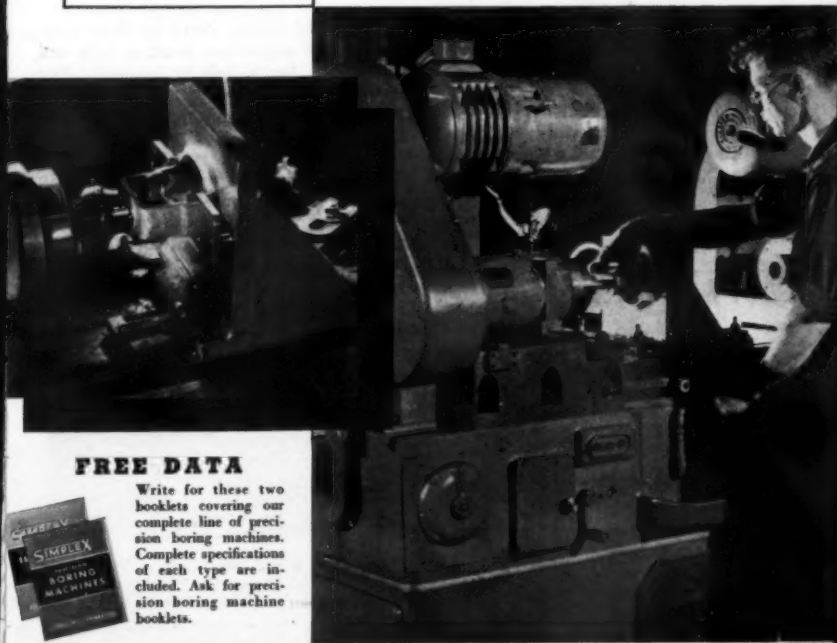
This Simplex Precision Boring Machine is designed for plants having a number of jobs of varying types to be handled by one machine. The bridges are made so they can be easily adjusted to suit the part being machined. A built-in electric facing control is provided with adjustable dwell.

### END BRACKET PRECISION BORED IN 50 SECONDS

In this installation, an end bracket bore is machined to 1.0230" ( $\pm .0002''$ ,

$-.0001''$ ). Boring Time is only 50 seconds. Finish is very smooth, and approximately 100 brackets are machined per tool sharpening.

Perhaps one of our 25 different basic models of Simplex Precision Boring Machines will serve you as well. Our engineers will be glad to make a study of your parts and production for faster and better precision boring. Send your part prints and production figures... no obligation.

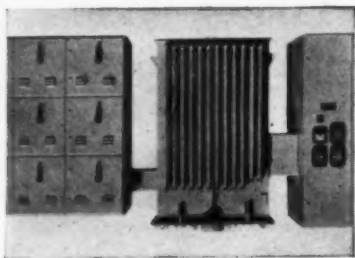


## FREE DATA

Write for these two booklets covering our complete line of precision boring machines. Complete specifications of each type are included. Ask for precision boring machine booklets.

## STOKERUNIT CORPORATION

DESIGNERS AND BUILDERS OF PRECISION BORING MACHINES AND MILLING MACHINES  
4530 WEST MITCHELL STREET MILWAUKEE WISCONSIN



Actual or model? This might easily be taken for a real unit substation installation.

we make a cutaway model, or arrange the model so that exterior pieces can be lifted to reveal the interior.

Wood patterns are made for all parts of the model that require castings. These patterns are made from the original drawings which have been scaled down. Castings made from the patterns are machined to the specifications of the model.

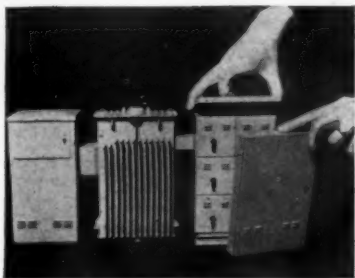
Scale to which models are built varies, and unless a model is going to be used for display purposes only, calculations for it must be figured accurately to the fraction of an inch. Obviously, if the model is not built accurately to scale, it can be misleading rather than helpful.



These parts can be assembled quickly in a number of combinations.

Some models have been built on a scale of one-half the size of the apparatus. Others have been constructed on a scale of 1/100th of an inch to the foot. This is the smallest scale that we

have ever used. It was applied for a model of one of the Company's Works which was exhibited at the New York World's Fair.



Model of a unit substation used for demonstrating flexibility of arrangements possible with standard equipment.

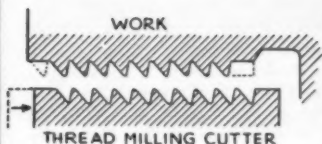
In normal times, more so than now, models are sometimes used to help sell equipment for a job or project. For example, a model of a radio transmitting station made several years ago, answered a number of questions a customer had in mind regarding location of the station, and in so doing aided in sale of the equipment for it. When completed, this model was really a topographic representation of the area in which the transmitting station was to be located. Needles were used for telegraph poles. A church in a small village nearby, 100 feet high in reality,



Model of a G-E Heat-Sealed Continuous Enameling Furnace (scale approximately 1½" to foot) originally built for exhibition at the Chicago Century of Progress Fair.

# How to MILL and RELIEVE

## Precision Threads in **ONE** **OPERATION**

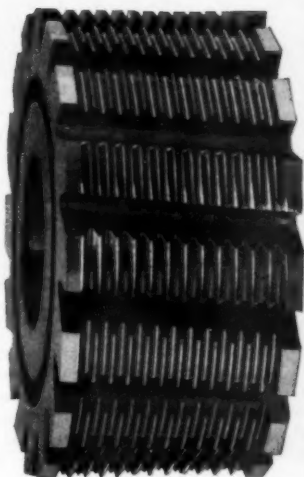


**T**HREAD MILLING, once considered a fairly "rough" method of cutting threads, today competes with thread grinding on the highest precision jobs, with the added advantage of vastly greater production speed.

Much of this is due to the accuracy to which "Detroit" multiple thread milling cutters are ground.

And now you can even relieve the ends of the threads while milling the threads, thereby facilitating assembly, reducing chance of thread damage, etc.

To do this, "Detroit" thread milling cutters, for both Buttress and National thread forms, are available with plain cutting ends on either one end or both.



In operation, as shown in the diagram, the feather edge of the thread is removed by the right hand part of the milling cutter, while the left hand end of the cutter mills the end of the shaft down to the base of the thread so that no thread is cut on the extreme shaft end.

Detroit Thread milling cutters are available for internal and external milling and both shell and shank types. They are today's standards in the aircraft industry where high precision and long cutter life is required.

THREAD GAGES  
RING & PLUG

TAPS

SPECIAL & STANDARD



**DETROIT TAP &**



**TOOL** *Company* 8432 BUTLER  
DETROIT

measured 1" from the ground to the top of the steeple in the model. Houses were built in proportion, as were hills, trees, a river, and other features of the landscape.

Occasionally, models of proposed equipment are made as an aid to artists and draftsmen who must make finished pictures and drawings of the equipment. In this case, the models are made from rough sketches, and descriptive information. They serve an important purpose, but of course they cannot approach the accuracy and perfection of the models made from scaled-down drawings.

Models are sometimes used to prove the practicability of an idea. For example, when a universal base for testing turbines was proposed, a model was first made to demonstrate that it could be adapted to fit various sizes of turbines being manufactured.

## Compounds FOR DRAWING STEEL SHELL

— ★ —

Yes, 20 mm to 105 mm steel shell can be drawn with Gilron compounds. Leading shell manufacturers report that scratching and scoring is completely eliminated.

A high film strength provides an excellent cushion between the die and shell. The film remains moist making cleaning rapid and free of surface formations.

Important to workers is the fact that Gilron compounds are non-toxic and have an agreeable odor.

Convincing list of satisfied users will be furnished on request together with complete production details. Write:

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A somewhat similar purpose was served by a model of a steam power plant made recently. In designing the station, several problems had been encountered in working out the piping arrangements with regard to the foundation. The model eliminated the possibility of costly mistakes in the actual construction of the station.

In some cases, it is necessary to make only a part of equipment or apparatus in model form. In still other cases, individuals concerned with only one part of a model of a complete unit can benefit by removing for study, the part in which they are interested.

As a rule, pattern makers or cabinet makers can most easily adapt themselves to model making. Patience and imagination are 2 characteristics that the model maker should possess if he is going to enjoy his work. Generally speaking, these 3 qualifications should be met by the model maker:

- (1) He should be able to read blue-prints.
- (2) He should know wood and metal working.
- (3) He should know molding.

In model making, the only deviation from standard molding practice is that wooden cores are sometimes used in patterns where the small size of the work makes it impossible to use sand cores. In these cases, the wood cores must be drawn before the metal is cold. Otherwise, expansion of the wood and contraction of the metal will prevent drawing the core. In making aluminum castings, a wood core will sometimes char, but it will not burn because it does not get any air to support combustion. White metal, which melts at a lower temperature and cools faster, will turn the wood light brown.

---

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FROM YOUR  
MACHINE TOOLS



Note curve in bracket for clearance in mounting variable speed unit—here the REEVES Motodrive.

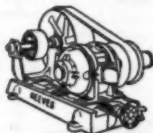


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Machine Tool Drive  
—A Bracket-Mount-  
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vides "Stepless," Accurate  
Speed Variation . . . . .**

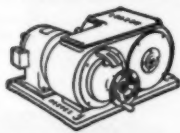
With this drive, designed and engineered for machine tools, operator can choose *exactly* best speed for any size, type and diameter of material in work. Accomplished merely by turning convenient handwheel while machine is running. Smooth, quiet vibrationless transmission of power. Send for full details in descriptive bulletin MT-421.

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**MOTODRIVE**—combines constant speed motor, variable speed drive and gear reducer, if needed, in one compact unit. To 10 h.p.; speed ratios 2:1 through 6:1.

● Compact assembly of constant speed motor, variable speed unit and mounting bracket for attaching to most machine tools by four cap screws.

# REEVES

## MACHINE TOOL DRIVE

# STEEL BOXES

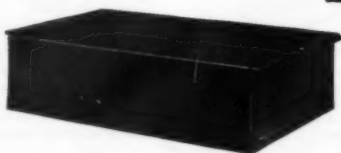
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Also made in rigid spindle types No. 1 and 2. Capacities: 4-40 to 2 inches in steel.

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# The Foremanship Forum

By EDMUND MOTTERSHEAD

## Part III—Waste Reduction

**W**ITH the immediate possibility that our steel furnaces may be running considerably below capacity soon, due to shortage of scrap—with deficiencies of critical materials, skilled labor, and above all a universal shortage of time, waste is today a "must" consideration of foremen. Ordinarily we speak of cost consciousness so that the foreman will direct all factors of production in his department towards greatest efficiency at lowest cost. Today cost steps aside for the simple urgency of the all-out war effort which demands all of everything . . . without anything being wasted.

Waste is most commonly thought of as the needless loss of material or of time, or of equipment; but there are other indirect losses, such as wasted man - power, space, and ideas, which add to the sum total of useless expenditures. These less obvious forms of waste today deserve more critical and detailed attention than they normally receive.

The first problem that management must meet in reduction of waste is that of building an organization capable of coping with the increasing responsibilities which must be faced in solving the problem of waste as well as other problems of war production. You foremen have a great part to play on the vital production front; but in following thru on the programs and policies of management in this respect, you should not jump to hasty conclusions and attempt such false econo-

mies as substituting inferior workmen for higher types of workmen, undermanning your department, or any unnecessary recommendations for cutting wage rates, safety precautions, etc. It is your patriotic duty to make a sympathetic and systematic study of the department to locate all points where waste occurs, and to correct these leaks.

Accidents, of course, are a serious cause of waste. The foreman is in a position to reduce this source of loss by improving safety measures, directing manpower effectively, and by gathering ideas from the shop and bringing them back to management for the formulation of new policies.

Machinery, tools and equipment in many plants are at least partially selected by the foreman and laid out by him. This offers opportunity for waste reduction. Use of space, routing of material, excessive handling and trucking are factors here.

A foreman can effect many savings by cooperating closely with the designing department. When a foreman observes possibilities of changing design to reduce labor required to produce the article; to permit the use of common labor instead of highly skilled labor; to make machining, assembling or handling easier; to make parts more easily interchangeable to save assembly and replacement costs, or to allow use of die castings, forgings, welding,

etc., . . . he should certainly show where these corrections can be made. Foreman often feel that it is beyond their province to make such suggestions, but such is not the case. They should use their own practical shop experience, here as elsewhere, to the best advantage of the whole organization.

One man writes: "Excluding accidents, I believe that the three most important sources of waste, or types of waste, are loss of time, manpower, and ideas. This wasting of ideas makes me good and mad at times. Time and again I see a good idea brought out and never used. Many times a good idea is not put in the hands of the right man to use it. So many of the old timers are indifferent to the younger men's ideas, pour cold water on them or steal the credit for them. Too little and too late has been our habit for some time. We have plenty of good ideas but don't act on them often enough."

I think you express something there that has needed saying for quite a while—the waste of ideas. The waste of manpower, of time, of materials and supplies, of machinery, space, power and fuel are costly but less important, as waste of ideas very often lies behind these other types of losses. I grant that foremen have many things on their minds . . . in fact so many that sometimes they really fail to think about any of them. Somebody once remarked:—"If you can get people to THINK, you have the answer to everything." There is waste, not only of ideas themselves, but waste all along the line for lack of thinking on the part of foremen, workers, and management.

Another foreman writes: — "Could you give me some brief summary of the ways in which waste results from accidents? Such information could be made very useful in this plant."

\* Gladly! The first cost that comes to mind is the cost of surgical and medical treatment for injured workers. Then there is hospital expense, expense of compensation to the injured party, expense of legal advice and service in connection with damage suits, with additional expenses in case of fatalities. You might say that such expenses are personal injury costs.

The second consideration is loss of production due to damage to machinery and equipment, spoiling materials in the accident, possible damage to the plant or facilities in case of explosions, etc., general confusion following the accident, the work and expense of breaking in new employees and fitting them into your scheme of things, and the loss of time of workers who were near the accident. Some of them no doubt were helping to aid the injured worker; some were curious as many people usually are around an accident; some stand around for lengthy periods and gossip; some have to take time off to act as witnesses in lawsuits arising from the accidents. Many times executives in the plant lose time. The foreman, the superintendent or other men probably have to investigate the accident, determine its cause, make and study reports, straighten out the confusion, repair and replace damaged equipment, settle damage claims, etc.

Other effects of accidents which result in waste or unnecessary expense are higher insurance rates which commercial insurance companies will charge if accidents are frequent in the company or department. Sometimes it also becomes difficult to get desirable workers for a department, as the work in that department or company gains a bad reputation for accident frequencies.

I would suggest that if you are planning anything in the nature of an accident prevention campaign, you dra-



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With the "E" pennant over our heads, and the "E" emblem on our coat lapels, we will carry on with renewed vigor in the great task before us.

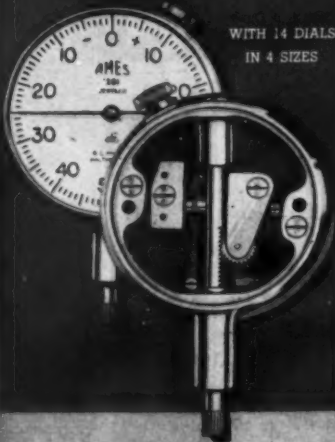
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SEND FOR CATALOG NO. 52

**B. C. AMES CO.**  
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matize each of these points with posters, with possibly some simple sort of contest for suggestions on accident prevention of one kind or another. Many companies use a merit badge system for accident-free workers and departments. Many have in each department, a bulletin board indicating the departmental record for accidents or lack of accidents.

A time-study man in Indiana queries:

—“How can I get the foremen to help me put over time-saving methods to the men? I have just been made a part of the organization here, and have found that wasted time and motion is costing the company plenty every day. But I want to change things tactfully if possible.”

I am glad to see one thing . . . that you want to do things tactfully instead of ramming your suggestions at the men. You should get a lot farther the way you are proceeding. You know, of course, that the big secret of getting somebody to adopt an idea is to make him think it was his own idea in the first place. Sometimes this procedure takes a little longer than a direct frontal attack. Yet, most of the time it produces better results. You have already studied the problem in the plant and have found time wasted along certain definite lines. Probably you have also laid out certain definite improvements which should reduce this wastage.

Now you can go to the foremen or the workers and say:—“Do it this way. It's better.” And they'll look at you and say to themselves, “Huh!” And you may or may not put it over. But I think if you go to the foremen for help and advice, things might move faster. For example, suppose you go to one foreman and say, “Look, Bill. I'm new here, and while I'm supposed to know something about time-study,





Adjusting screw bearing is long and strong, insuring long bearing life.

Jaws are hardened steel, accurately machined. Available either plain or grooved for holding round pieces.

Adjusting screw has fine pitch thread, insuring close, tight adjustment.

Vise is accurately graduated for adjustment to full 90 degrees.

Adjustable supports which lock vise in any desired angle.

Model M swivel base furnished with two  $\frac{3}{8}$ " hardened blocks to fit slots in machine tool table. Adjustable over 360 degrees.

## This New-Type Vise Will Do Hundreds of Jobs in Your Plant

*Drilling . . . Milling . . . Grinding . . . Filing . . . Fitting . . . Marking  
On Your Production Line . . . In Your Tool Room . . . On Your Benches*

• Vises, as we know them, have been just vises for over a hundred years. But the Palmgren Angle Vise is a new-type vise designed and constructed to meet present day requirements on the production line, in the tool room, on the bench—on all particularly difficult angle jobs.

The features emphasized above and described below will verify this statement.

It can be used on a drill press, a milling machine, or a grinder, eliminating clamps, wedges or other make-shift methods, and permits setting up for angle work accurately and quickly.

It can be set at any desired angle up to a

full 90 degrees by adjusting it to the proper degree and locking the adjustable supports.

Every part of this vise is accurately machined. The base, body and sliding jaws are of semi-steel castings. The jaws are hardened steel and can be supplied either plain or grooved.

It can be used as a bench vise with or without two different auxiliary bases. Note the specifications below. If your local supply house does not have Palmgren Angle Vises in stock, send us his name and we will see that you are supplied with reasonable promptness, assuming that the order can be placed under the proper priority.

Model	Width Jaws	Depth Jaws	Opening Jaws	Overall Length	Kind of Jaws	Weight Vise Only	Can be supplied with Model M or Model B swivel base or without base.
000	2½"	1 7-18"	2½"	6¼"	Hardened Grooved	9½ lbs.	

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*Manufacturers of Palmgren Products for Over 25 Years*

# PALMGREN ANGLE VISES

I don't know much about your plant yet. I don't know anything about your department except in a general way. The front office got me in here to help cut down wasted time, and I wonder if you would help me out a bit. I see you've got an air hose at a number of the stations here. Do the men ever kick about not having pressure in the line?"

"Why," he says, "sure they do.



## SAVES LABOR

You will eliminate many costly hours from your Payroll by using the **JACKSON TIME-SAVING VISE**. It saves the time wasted by your Machinists in hunting for Bolts, Clamps, Angle Plates, etc., when rigging up work on the Drill Press, Miller, etc. Of still greater importance is the saving in output you effect by not having your productive machine standing idle during the rigging up process, for the—

### JACKSON TIME SAVING VISE

by means of its revolving jaws and supplementary jaws instantly holds the thousand and one shapes that arise in machine work.

SEND FOR BULLETIN NO. 23-B

**BROWN** 126 N. THIRD ST.  
ENGINEERING CO. READING PA

They're always kicking about something. That line has needed fixing for sometime now."

"H-m-m-m. What about that big planer over in the corner? Can that fellow see what he's doing in that light?"

"I don't know. I couldn't, I guess. But we don't use that old baby except once in a while, and just never bothered to do anything much about lighting it up."

"Well, Bill, I'll just wander around here a bit and see what I can find to help things along. After a while I'll come back and maybe ask you some more questions. I want to do my job right. If there is anything that looks as tho it will help you get results in this department, I'll mention it to you. I know that there are a lot of things you think of from time to time and you get so busy you can't do anything about all of them. So, don't feel that I'm being nosey, I just want to help. OK?"

Well, of course, you don't always meet with even that much of a reception, but after awhile some of it will begin to sink in and the foremen will begin to correct things themselves. Many of the changes will be their own ideas. And when you go back to them, bring up the matters you have observed in the departments. Remember that you're just asking for information so you can figure things out and be help-



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As the saying goes, "You asked for it." Responding to a definite recurrent demand, we put some 30 years' experience to work, incorporating, notably, these features:

- (1) Big, husky spindle of chrome nickel steel heat-treated and mounted on 200-lb. pre-loaded precision bearings.
- (2) All lead screws and feed gears mounted on Timken bearings for smooth, quiet running and longer life.
- (3) Overload protection on all motors to prevent motor failure and resultant breaks in production.
- (4) Ample coolant sump in base. (Pump optional.)

- (5) Hand wheel and lead screw on spindle head for quick shifting of belts for changes of spindle speeds. . . .

- (6) 12 feeds and 12 speeds to broaden production range.

Longitudinal feed, 18"; cross travel, 8-1/2"; vertical travel 16". Table working surface, 8' x 32". Cutter capacity, 1/16" to 2-1/2" mills. Spindle speeds: two optional ranges of 12 each, 100 r.p.m. to 1800 r.p.m. and 200 r.p.m. to 3600 r.p.m.

The "Cleveland No. 1" has great speed and power, combined with strength, rigidity and accuracy. It qualifies wherever output must jump. Bulletin tells why.

Ask for Sommer & Adams Bulletin "D"



THE **SOMMER & ADAMS** COMPANY  
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*Custom-Built* EQUIPMENT FOR MANY PURPOSES

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SOCKET HEAD  
CAP SCREWS

MILLED  
FROM BAR



HOLLOW  
SET SCREWS



MADE OF  
ALLOY STEEL

**ECONOMY MACHINE PRODUCTS CO., 5207 Lawrence Ave., Chicago, Ill.**

ful to them. By the time they give you answers to your questions, they probably will also have found solutions to a lot of things and be on their way to putting their own ideas into practice.

This strategy applies equally well to the foremen for getting waste-reduction ideas across to the men. First, determine what are the ways in which time is wasted . . . by improper routing of material, by poor lighting, insufficient heating, poor planning, lack of cooperation, poor scheduling, men waiting for parts or materials, men gossiping during work, men starting late or quitting early, horseplay on the job, or what. Then develop a definite plan of action to correct these evils. Such a program should contain at least three factors:—

- (1) A pattern of conduct for yourself.
- (2) A pattern of conduct for the men.
- (3) A method of making suggestions along pre-determined lines to save time in the various operations in the department.

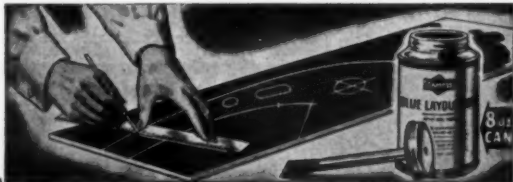
In planning a pattern of conduct for yourself, first make sure that you, yourself, completely understand production orders, and that you then give clearly understandable orders to the men. You have to cooperate with the management and with the other foremen to speed up work and avoid friction. Further responsibilities which fall on you as a foreman, in order to save time, include:— checking blueprints and specifications, planning, routing and scheduling of work, providing proper machinery, tools and materials for each job, plan work on the product to eliminate unnecessary work and handling, etc.

In determining a pattern of conduct for the men, first consider the problem of shop discipline. Enforce it firmly but in a friendly way. Men must start promptly and quit at the scheduled time, not before. See that the workers are kept fully provided with tasks. It will eliminate much horseplay and gossip. By giving men adequate super-

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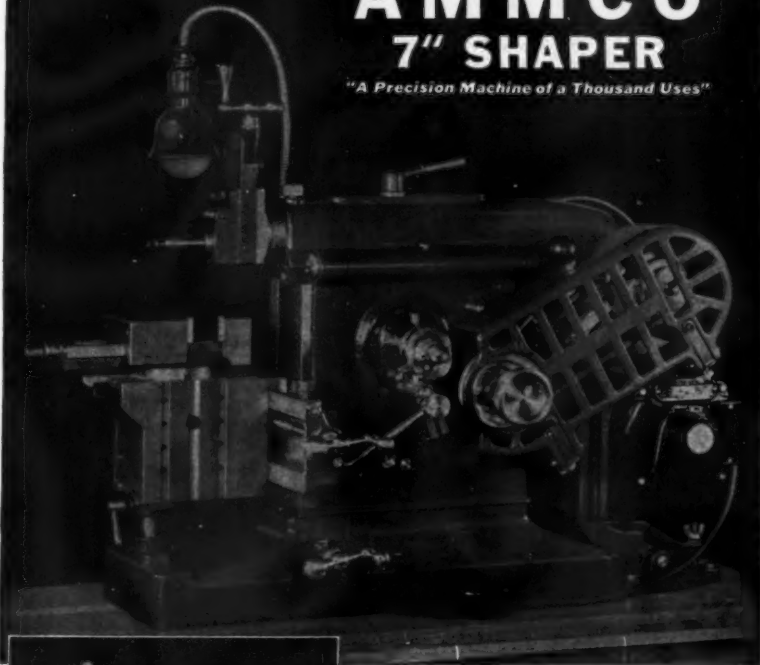
Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals., drums. Send for sample now!

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**-- Saves Steps and Time --**

Don't tie up a big shaper when so many jobs can be done just as accurately and much quicker and more economically on the AMMCO 7" PRECISION SHAPER.

Available for stationary installation or mounted on portable cabinet easily rolled to the mechanic's workbench... Write today for specifications and prices.

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2106 Commonwealth Avenue North Chicago, Ill.

vision and proper instruction, you can see that work is done correctly in the first place. Then men should keep the machines in proper repair, see to the correct set-up, keep small tools and equipment in correct places, care for them properly, use proper speeds on machines, pile materials in the right places and in the right way.

Your method of making suggestions should, of course, vary with the men and with the suggestions you want to make. However, just a general reminder . . . make the worker feel that the new idea is his own idea. And give him encouragement for putting it into practice.

An Illinois foreman says:—"It seems to me that a great deal of our trouble comes from just ordinary human selfishness. Everyday I pick up a newspaper, I read about some racket which is holding back some portion of our war effort. Why not have a campaign

to eliminate this 'WASTE OF WILLINGNESS'?"

"Waste of willingness?" . . . I like that term! I also agree with you that there is a great deal of it these days. Many, many people are chiefly concerned with looking out for their own hides . . . it has always been so. But the rest of us who are sincerely interested in making an effort to win the war, whether that effort be service in the armed forces or in the production line, are deeply concerned with hampering influences.

Human selfishness is among the toughest things in the world to buck up against. Combine it with fear, craving for security and self importance, and it is something against which most persuasion other than hard money is of little avail. All I can say is that we have to meet it as best we can. It is just another instance where the foreman today must be a leader,



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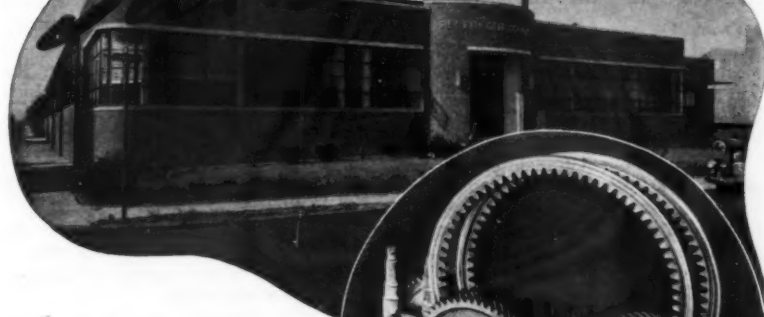
*for Long, Hard  
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BALDOR builds a complete line of Bench and Pedestal type grinders — 6" to 12" wheels. (At left is special Carbide Tool Grinder, 6" wheels, complete for \$95.00).



**BALDOR**  
BALL BEARING **GRINDERS**

# Sier Bath GEARs



## HEVI DUTY FURNACES

Top quality for Sier Bath "Tailor Made Gears" is assured through uniform heat treatment. Sier Bath gears are carburized in Hevi Duty Vertical Retort Electric Furnaces having multiple zones of heat control—a guarantee of uniform and precision carburizing.

Send for Bulletin HD-142.

*Above—The new Sier Bath Plant at North Bergen, N. J.  
Below—Two HD-1824 Vertical Retort Furnaces at Sier Bath.*



## HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES **HEVI DUTY** ELECTRIC EXCLUSIVELY  
MILWAUKEE, WISCONSIN

must inspire his men to follow him personally, build up loyalty and enthusiasm to the point where men's regard for him will, in a measure, counterbalance other influences.

From Cleveland, Ohio, comes this unusual letter, which is reprinted almost in full. It contains the experience and knowledge of a man whose life has been lived for the purpose of safe and economical factory operation:

"I have been chief maintenance engineer in this plant for the last 16 years, and have had some success in getting foremen and the workers to help me in solving our maintenance problems and keeping the plant in good running order. It may be that some of the new foremen who are facing these problems for the first time would benefit by some suggestions based on more than 25 years of practical experience. It is with this in mind, considering the present need of reducing waste along these lines to aid the war effort, that I am writing you.

"It is very hard these days to get new machines. In some departments in our plant they have been waiting 6 or 8 months for new machines and have not yet received them. Machinery and equipment need more care than ever these days. Also, there is talk of a power shortage . . . shortage of electricity, as well as shortage of oil. Fuel and power, and lubricants, and cool-

ants, and cleaners . . . we use them all; likewise water, fuel oil, gas, compressed air, steam, hot air, electricity, gasoline power, emulsion solutions. These things cost money, and wasting them represents a very serious threat to our war effort.

"With that in mind, I want to list the most common ways in which power, fuel and machinery are wasted due to negligence or lack of using just a little common sense:

- (1) Overloading motors, machinery and equipment.
  - (2) By using improper drives for machinery, wrong pulley sizes, etc.
  - (3) Using wrong speeds of machines for various operations.
  - (4) By running machinery when idle or by failure to shut off motors when machines on the line shafts are not in use.
  - (5) By neglecting defective piston rings, cylinders, and packings in air and steam cylinders.
  - (6) Poor original design of machinery and equipment, together with improper placement on the working floor, both as regards flow of work and sources of power.
  - (7) Failure to give proper care and attention to idle machinery.
  - (8) Using the wrong machine or piece of equipment for a job.
  - (9) Belt slippage and loss of power.
- This is the maintenance man's job, but



"HDW" Heavy Duty Rotary—2000 counts per min.

## A NEW HIGH-SPEED PRODUCTIMETER for the PRODUCTION FRONT

Especially adapted for quick starting and stopping applications...moderately priced...double worm drive, oil-less bearings, light-weight strong plastic wheels, hardened steel parts...assure smooth action and dependable service.

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# The DRIVE

**T**ODAY every machine tool, regardless of age, must be working at top capacity. But it just can't, if it is still running from an overhead, lineshaft, shop cluttering belt drive. You know that—so you decide to motorize with an individual, close-connected drive for each machine. Fine! But don't do a half-way, make-shift job. Get a Berkeley and get *maximum* production, not just more production. Write today and let us show you the difference.

**TO GREATER PRODUCTION**

Berkeley Drives do more because each one is individually engineered, with welded steel mounting bracket, to become an integral unit with the specific machine for which it is ordered.

Easier to install, they have the staunchness required for today's higher speeds and heavier cuts. If you want a power drive, you want a Berkeley!

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ANY MACHINE TOOL**

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**BERKELEY EQUIPMENT COMPANY** 210 S. FIRST ST. CORRY, PENNA.



## 3 ROUSSELLE PRESSES

4½ TON - 10 TON - 15 TON

Rousselle Punch Presses are popular for Defense work because they combine real capacity, high speed and low cost. Equally important, you can have prompt shipment on any of the three sizes — No. 0, 4½-ton; No. 1, 10-ton (both open back inclinable); and the 15-ton Horn type. Write, wire or phone for data, name of nearest dealer.

Dealers a few choice territories still open



★  
**PROMPT  
DELIVERY**  
on this  
time-saving  
War  
tool.

★  
**DAVID J. ROSS CO.**  
BENTON HARBOR, MICH.

workers should watch for it and report it before he has to come to take care of a breakdown. It is usually easy to detect if they will watch.

(10) Failure properly to lubricate electric motors . . . running them hot.

(11) Failure to lubricate steam or air cylinders.

(12) General lack of lubrication of moving parts on any machinery. More oil can be saved by using it consistently than by forgetting to use it and then trying to repair the damage or nursing along a crippled machine.

(13) Needless use of compressed air, steam, coolants etc.

(14) Making more steam than needed for use.

(15) Burning unnecessary lights in the daytime, altho the workers should have plenty of light. Placement of lights to best advantage plus use of fluorescent lamps in many cases, is the answer. Moving parts of machines should be painted contrasting colors, to make them stand out against dark back grounds.

(16) Burning furnace fires when not needed is another source of waste. Some judgment should be used here as to the comparative expense of maintaining fires, or firing up when and as needed.

(17) Ordering unnecessary quantities and kinds of small tools and equipment; wasting tools thru breakage, because worker does not know the job or how to handle the tools, and should be instructed.

(18) Lack of salvaging of broken tools and parts which can either be repaired or converted into something else that is useful. Our shortage of scrap will not be solved by breaking up good tools and machines just to melt them down again.

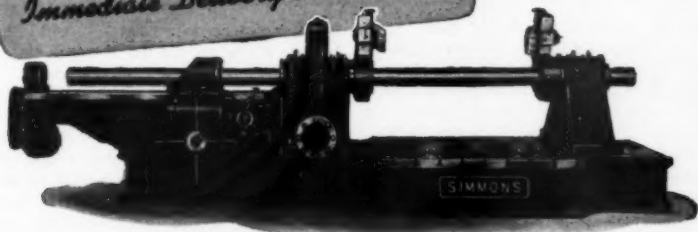
(19) Defective valves, and use of wrong kinds of packing in them.

(20) Improper setting-up of machines. If the worker can't do it right,

# SIMMONS 6" BAR HORIZONTAL BORING AND FACING MACHINE

*Immediate Delivery with 17' Bar*

EQUIPPED WITH  
SIMMONS  
MICRO-FEED  
UNIT



**T**HIS new Simmons 6" Bar Horizontal Cylinder Boring and Facing machine has been designed specifically to solve current war-production problems. The bed, which is of massive construction, is heavily ribbed to insure maintained alignment.

Equipped with Simmons Micro-Feed Unit, an infinitely variable transmission, this boring machine offers both fine and coarse feeds ranging from .004" to 1.000" per revolution of spindle. The boring bar is of turned and ground high-carbon steel thoroughly normalized, with Brinnell hardness of approxi-

mately 220. Standard length of the boring bar is 17', but lengths up to 24' may be provided.

The main drive to the boring bar is obtained through a six-speed gear box, motor driven. Gears are of high-carbon steel and mounted on spline shafts with anti-friction bearings running in oil. Power Rapid Traverse is supplied to the bar in both directions.

*Write today for description bulletin*

## SPECIFICATIONS

Diameter, Boring Bar	6"
Travel of bar in one setting	60"
Capacity of facing heads	9" to 38½"
Widened portion of bed,	51½" x 68", 18" high

## SIMMONS MACHINE TOOL CORPORATION

Main Office: 1725 NORTH BROADWAY, ALBANY, N. Y.

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# SIMMONS

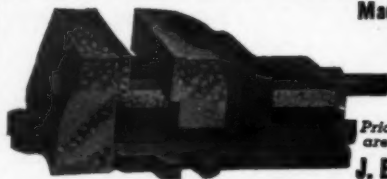


LATHES • TURRET LATHES • MILLERS • PLANERS • 6" BAR BORING MACHINES

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Made Right—Work Right—Give Satisfaction

### Drill Press Vise



With Extra Lugs for Bolting Down

No. 1—6" jaws, 1 1/4" deep, opens 5" wt. 35 lbs. \$26.00

No. 2—10" jaws, 2 1/4" deep, opens 8 1/4" wt. 90 lbs. \$38.00

Prices are net f. o. b. Chicago. Dealers' inquiries are solicited. Write for illustrated folder today.

**J. E. Plunket Machine Co.,** 1823 W. LAKE ST., CHICAGO, ILL.

somebody should do it for him. We use a complete set-up-man system here.

(21) Too much handling and moving around of machinery. Plenty of machines get out of balance easily. Most of them also need time to adjust themselves to the new floor space and more or less work into it. There are plenty of cases and stories of some old machine that only one man could run, because he knew when to kick it, when to shake it, etc. Plan it right the first time.

(22) Confusion and delay in ordering repair parts; in having needed adjustments made and in calling some operating defect to the foreman's or maintenance man's attention.

"I hope these suggestions will be of some value to other foreman who read your column. The application of even 1 or 2 of the principles enumerated will result in substantial savings."

Certainly, if all of the suggestions

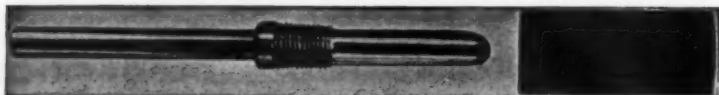
in that letter were carried out effectively, there would be a great deal of saving for everyone and a very substantial contribution to the war effort.

Another man writes: "What about blueprints? We have a lot of trouble with blueprints here, and I am sure that if the blueprints were always what we would like them to be, there would be a lot of waste eliminated all along the line."

Blue prints are a problem in many plants. Often they are the cause of mistakes, production losses, discontent and inter-departmental bickering, wasted time, manpower, and materials . . . and a constant threat to the drive for war production.

The foreman can help this situation in several ways. Before prints are made, he can suggest features in the original designs of the articles to utilize his own practical experience and improve both production speed and the quality of the production itself. Before

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Designed for precision work where flexibility is required, these wheels are useful accessories for sanding and finishing regular and irregular jobs, penetrating into difficult recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request. Prompt Deliveries.

**FIELD ABRASIVE SPECIALTY MFG. CO.**

**203 LOWE BLDG.,  
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**THE MOST FOR YOUR MONEY**



**NO. 5 FLYWHEEL TYPE**

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**HERE'S  
PERFORMANCE  
YOU CAN  
RELY ON!**

Write today for literature about  
Marshalltown Presses — avail-  
able in capacities from 5 to 70  
tons.

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BETTER PRODUCTION  
LONGER LIFE**

Marshalltown Presses are engineered and built to give the utmost in dependable, trouble-free service. More die space — chrome molybdenum cranks, wrist pin connections and many other proven advantages. Available in capacity of 5 to 70 tons — each one an outstanding value.

**MARSHALLTOWN MFG. CO.**  
**900 NEVADA STREET      MARSHALLTOWN, IOWA**

handing prints to his men, he can carefully check them over for errors, for missing information, for illegibility and report these faults to the blue-print room and try to get a good and correct print for his men. On any doubtful prints he can consult the engineering or designing department to check on details in question.

One of the best things that he can do to help in the matter of blueprints, is to instruct and supervise the men in the care of blueprints. Some plants use cellophane or lumerith transparent envelopes on all small prints. Some of the prints may be mounted on sheet metal or plywood and coated over with shellac to preserve them. Some have a definite library system for checking in and out the basic master prints on jobs.


Another thing which the foreman can do to solve this problem is to be sure that each of his men has adequate

knowledge of blueprint reading to handle the designs that come to his work station. One factory I visited recently is giving all their foremen special instruction on blue print reading, and blue-print instruction for the men.

An assistant plant superintendent in New York writes about an interesting experiment in waste reduction: — "In our plant we have set up a Manpower Conservation Program, designed to utilize all available man-power to the best advantage. In our foremen's meetings we develop ideas for this program and then put them in action in a systematic way. We have obtained some good results so far, but would also like to have some ideas from outside the plant. Could you high light for us some points in plant operation where wasted manpower frequently occurs?"

Your plan sounds very interesting, and I am only sorry that you did not include in your letter the working details of it so that I could give it more detailed publicity in this column.

Manpower is wasted whenever materials or space or time or other factors are wasted . . . you might say that whenever anything is wasted which has taken labor to produce or to transport to its existing site, there is a waste of manpower. And this is important, because it might be said fairly accurately, that the cost of manufacturing almost any article of war is very largely labor cost . . . in some cases as high as 85%. Thus, when a highspeed tool is broken, you waste not only the price of the tool, but also the time of the man who makes that tool, the time of the workers who provide the toolmaker with steel, time in transportation, secretarial and managerial time in ordering the replacement, the time of the workman who is more or less idle without that tool, and the time of other workers down along the line who are slowed up because of the temporary bottleneck.



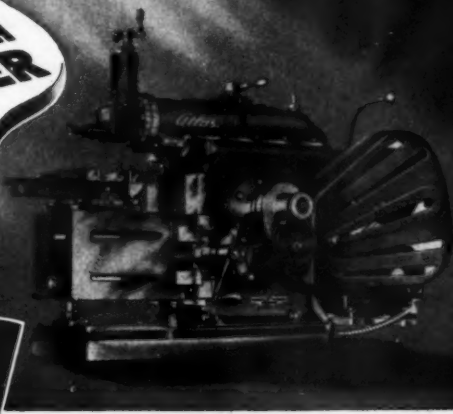
**DYKEM STEEL BLUE  
STOPS LOSSES  
making dies & templates**

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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# Atlas 7 INCH SHAPER



In **any** tool room, the Atlas Shaper makes snap gauges, small tools, and commutator dies.

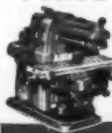
## "Match the Machine to the Job" for Top Production

That fundamental idea—"Match the Machine to the Job" is an important reason why American war producers are forging to the front in the battle of production. The massive jigs and huge assemblies are monuments to American ingenuity and production power.

Just as important are the fast precision tools that take over the production of small parts so that the capacities of larger machines will not be wasted. The Atlas 7" Shaper is one of these valuable smaller tools. It handles everything within a 7" stroke. It is a counterpart of the larger shapers in precision, production and power, and is more flexible in set-ups. 5 automatic cross feeds in either direction and four speeds between 45 and 200 strokes per minute give a wide operating range. It has a complete V-belt drive, crank-type bull-gear drive, and operates from a 1/2 HP 1740 RPM motor. You will find Atlas Shapers in many of the plants that are winning "E" awards. Send for complete information. Atlas Press Company, 1150 N. Pitcher St., Kalamazoo, Michigan.



### OTHER ATLAS EQUIPMENT FOR WAR PRODUCTION



#### MILLING MACHINES

Compact, powerful bench millers for full range of milling work.

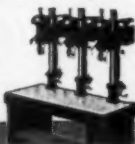


#### LATHES

Backgeared, screw-cutting lathes with V-belt drive, power cross feed.

#### DRILLING MACHINES

Setup production on small-hole drilling, tapping, 4, 3, 2-spindle models.





**DELIVERS  
FROM THE SAME PORT**

*Regardless of  
Direction of  
Shaft Rotation*

**ONLY TUTHILL AUTOMATIC  
REVERSING PUMPS GIVE  
YOU THIS PERFORMANCE**

Without the use of check valves, Tuthill Automatic Reversing Pumps deliver from the same port regardless of direction of shaft rotation. This exclusive feature in these positive displacement, internal-gear rotary pumps solves the problem of driving a pump from a reversing shaft without changing the flow of the pumpage. It also provides the answer where the ultimate direction of shaft rotation is not known. Sizes from 1 to 50 g.p.m. and pressure to 100 p.s.i. Available with or without relieving feature. Also in stripped model form.

Write for Tuthill Automatic  
Reversing Pump bulletin

**Tuthill PUMP COMPANY**

939 EAST 95TH STREET • *Chicago*

Using faulty or out of date equipment is a waste of manpower when better machines and methods are available. Under present machine shortages, it is not always possible to do anything about it. Similarly, equipment may be inadequate for a job, and breakdowns occur due to overloading. It is no fault of the worker, but wastes his time and the time of the men making the repairs etc.

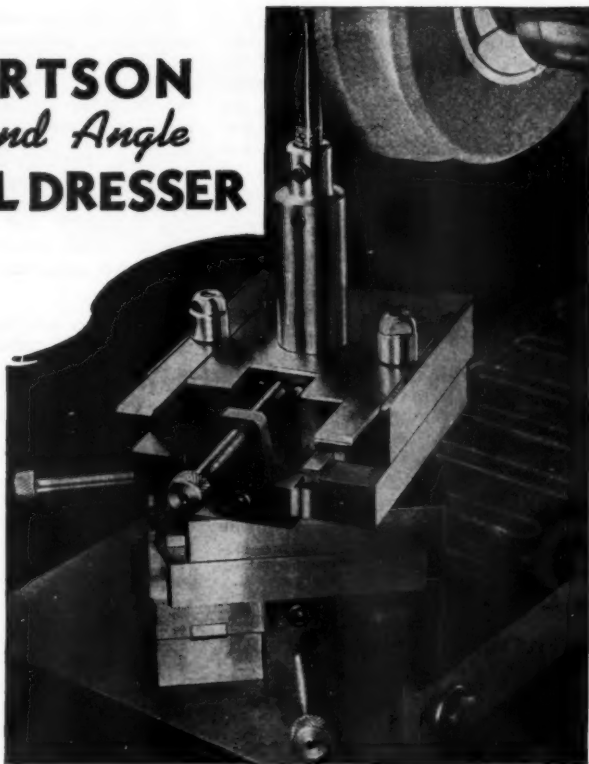
Laxity in shop discipline wastes manpower. This may involve horseplay, absenteeism, tardiness, quitting early, lunching or smoking at will, gossiping. Having too many men on the payroll or on a job, not only wastes time and money, but the men tend to get into each other's way and waste still more effort and manpower. Having too few men on the payroll or on the job, keeping your department understaffed may mean excessive overtime, or overly long shifts for the men, fatigue and consequent inefficiency in the work with reduction in quality and speed as well as interest in what they are doing. The net result is wasted manpower.

Negligence in production planning, including the layout of the plant, its design, availability and types of power for the machines, routing of materials, production schedules, will lead to wasted manpower.

The use of a skilled worker on an unskilled job is a waste of his ability. It may also mean that he becomes disgusted and quits which means increased labor turnover, another source of wasted manpower. If working conditions could be improved but are not, men will tend to go elsewhere. And you must remember that labor turnover wastes not only the time you spend breaking in new men, and the time you spent in the past breaking in the ones who left. Lost as well is all the time of those around while the be-



*The*  
**ROBERTSON**  
*Compound Angle*  
**WHEEL DRESSER**



*Write TODAY  
for illustrated  
descriptive  
folder.*

**saves precious man-hours in production**

This precision instrument is playing a vital, important part in America's all-out war effort . . . speeding-up production, by saving both time and money.

With the Robertson Compound-angle Wheel Dresser, a machine operator can dress an included angle tangent-to-radius from  $0^\circ$  up to and including  $180^\circ$  at one setting, thus eliminating the old method of "trial and error" dressing.

**F·H·ROBERTSON CO.**  
**420 BROADWAY - MALDEN, MASS.**

ginner is fitting himself into things . . . but ALSO the man's time while unemployed, the time and strength of the nation which has the expense of unemployment compensation, and the time and money of the new employer who must break him in also. Labor turnover is a tremendous waste of manpower. It is better, whenever possible, to transfer the men within the plant so that at least some of their experience in the plant may be utilized.

The clarity of orders given and the way in which the men understand them can waste manpower. If the maintenance crew is not on its toes, or if the workers are lax about noticing situations which call for maintenance work, manpower is wasted. Lax inspection standards may mean failure of the product when it leaves the factory. The defectives come back, and the plant makes them good, but if inspection standards were high enough, were made clear to the workers, and were enforced, much manpower would be saved.

I like the idea of the Manpower Conservation Program. You not only hit on manpower thru it, but you also strike at almost every other source of waste in the entire plant, and at the same time have an opportunity to make the idea of waste reduction dramatic in its appeal to workers and effective in getting results.



Angle Plates for, Boring Mills, Drills, Grinders, Layout, Inspectors, Surface and Lapping Plates, Prompt Delivery.

**TATRA TOOL CO.**  
16317 Sanford Ave. - Cleveland, O.

It may be that other companies are undertaking programs of this sort and that they will write us about their experiences. Certainly anything we all can do along this line will be a contribution to our biggest job.

Taking it all in all, waste of time, waste of manpower, waste of ideas, waste of williness, waste of machinery and equipment, fuel, power, lubricants, space . . . all present a vital problem and many opportunities for improvement.

Space does not permit discussion of the problem of material waste, because it involves so many things and situations. The other types of waste all have a direct bearing upon wasted material. But, when material is once wasted, you can do something about salvaging it, which is impossible with wasted ideas, time and manpower. The DuPont Plant in Gresselli, N. J., has accomplished some outstanding things in its War Production Drive Committee salvage campaign. Its report shows many things that were done to save everything from copper wire to old dry cell batteries, broken tools, rubber gloves, valves, extension cords, scrap steel, monel metal, and what not. A condensed version of the committee report appeared in the July, 1942 issue of *The MACHINE TOOL BLUE BOOK*. A full report may also be available from the DuPont Company.

War is waste, from the standpoint of social philosophy, waste of goods and land and lives. We are taking our stand in this war to preserve respect for the dignity and rights of the human individual. We are fighting for freedom of expression, freedom of worship, freedom from want, freedom from fear. And on the home front and the production front, the campaign against waste will be a vital factor in the outcome of that titanic struggle.

(To be continued)

**ARO**

**PNEUMATIC TOOLS**

**SHORT GRINDERS  
FOR ONE HAND  
OPERATION**

★ This War is no push-over! *Every* ounce of human energy...*every* pound of plant production must be exerted...NOW!

Our job is building Pneumatic Tools for small tool work, TO HELP TURN OUT MORE PRODUCTION AT GREATER SPEED WITH LESS OPERATOR FATIGUE.

The short grinder illustrated not only can be used for grinding but is excellent for rotary file work on aluminum, magnesium and non-ferrous metals. It is light

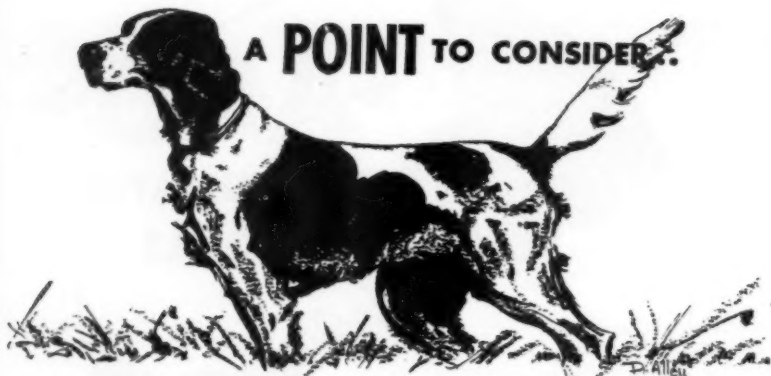
in weight for one hand operation, yet it has ample power for round-the-clock production. Many large plants have standardized on the Aro 22BGS Short Grinder for castings finish.

ARO Rotary Pneumatic Tools are powerful...ruggedly constructed...simple in design...lightweight...stall-proof. They are ideal for drilling, grinding, screw driving, nut setting, filing, sanding, etc.

Send for complete catalog or see your Jobber.

**THE ARO EQUIPMENT CORPORATION • BRYAN, OHIO**

*Pneumatic Tools . . . Lubricating Equipment . . . Aircraft Products*



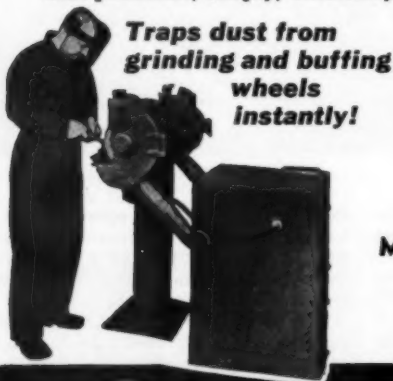
**A POINT TO CONSIDER.**

## **DUST CONTROL IN YOUR PLANT**

Today, more than ever, "dust control" is recognized as an important necessity to industry.

"All out" war production must not be impaired by machine breakdowns or lost man hours.

Torit self-contained, portable Dust Collectors will solve your dust problems, simply, efficiently and economically.



**Traps dust from  
grinding and buffing  
wheels  
instantly!**

● Write today for bulletin giving Torit features, specifications, prices, or give us your "dust problem" and let us recommend a solution, without obligation.

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303 Walnut Street  
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**TORIT Dust Collectors**  
**SELF-CONTAINED UNITS**

# Aspects of Modern Milling

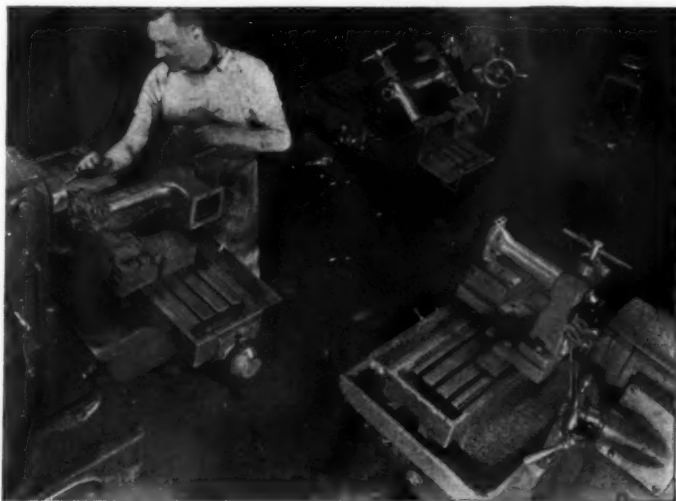
## Types of Machines—Part IV.

By JOHN E. HYLER

**T**HE tremendous scope of work involved in modern milling machine practice, and the vast difference in economic factors affecting the same kinds of work in different plants and under different conditions, has increased the number of machine types to the place where direct attempts at classification are as likely to confuse as they are to clarify. Since the better-known and traditional types are already fairly well classified in the minds of most of us, I content myself with entering directly into a considera-

tion of that popular type of miller known as a plain milling machine, or as a plain knee and column type.

This machine, fitted with an ample base plate, has a massive column arising from the back of that base. The column supports the so-called knee, which in turn supports the milling machine table. The column also supports the spindle, in a horizontal position at comfortable working height. In most cases, it also supports an overarm, which extends out over the work table, and carries bearings to support



One man tends 3 milling machines, working on sewing machine heads. (Photo—courtesy Cincinnati Milling Machine Co.)

the weight of milling machine arbors, and to hold such arbors rigidly against such thrust as the cutting action may develop.

However, production knows no iron-bound laws in the case of any type of milling machine. It follows that millers of the type described, if the duty they are called upon to perform warrants it, may be had without an overarm. This is especially true in cases where parts being milled may have that machining planned, so that all cutting can be done very close to the machine column. This is true of the case shown in the illustration, where 3 machines produced by one of our foremost builders are shown arranged in close formation, so that one operator can attend to all 3. Two of these machines, you will notice, carry facing cutters, while the one directly behind the operator carries a saw or slitting tool, and a different type of fixture is used on the table of each machine, designed for the specific operation involved. While 2 of the machines are working, the operator is unloading and loading the fixture on the third.

In this particular case, as mentioned, no long arbor and no overarm are required, because the cut is made very close to the supporting column of the machine. In every case, it should be remembered, that even when one has an overarm, he should plan all machine setups so that as much as possible of the cutting will be performed as close to the machine column as possible. That is where maximum stability is found in any machine of this type, and keeping this in mind, it will be easier on both the work and the machine.

In the case of the operator shown, the nature of the work is such that he will automatically be on hand at each machine as the time for unloading and for reloading comes. In some cases, where an operator turns his attention

from a machine, his work is so outlined that he may not notice when the machine feed stops at the termination of a cut. It is possible, and very convenient in such cases, to arrange an alarm that will ring a bell. A contact point is placed on the machine, and insulated from its mounting, so that it will have connection electrically only when the table dog arranged for the purpose, comes into contact with at termination of the cut. The contact point, an electric bell, a battery and the machine proper are connected in series so that the when the dog contacts the point, a circuit will be closed and the battery will sound the signal. Any good electrician can rig up such a device.

The milling of small quantities of lightweight parts is a far different proposition from work machined in large quantities. Yet it is necessary to have a milling machine for the purpose, and a lightweight form of knee and column machine is used for most of these cases, and the units are termed hand milling machines. Really, the significance of the term arises from the fact that the table feed is actuated by hand rather than by power. Even among the hand millers, however, there is considerable difference in design. One very good machine of floor type (for hand millers divide again between floor and bench models) which has a built-in coolant pump and piping, provides 6 different spindle speeds in each direction, forward and reverse. This machine is really a fairly heavy-duty unit for a hand miller, and has the motor placed in the base.

A look around among the smaller types of milling machines soon reveals that most all of the bench models are hand millers. One splendid bench type of plain miller I have noticed may be had either with hand operated controls or with automatic feeds, and is considerably used for small parts produc-

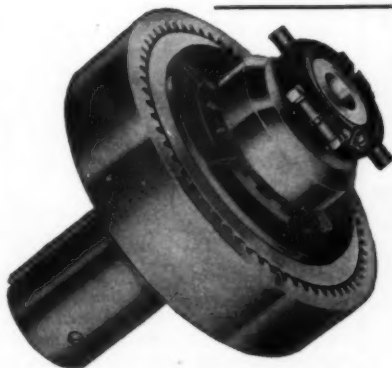
**INSTALL**  
once and for all

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**JURZEK MACHINE AND  
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**2305 Hilton Rd., Ferndale, Mich.**

tion. Neither should it be supposed that because a milling machine is small, it is not a competent tool for the purpose for which it has been designed. One small machine in mind may be had with either Timken roller bearings or ball bearings applied to the spindle, is motor driven, rests on a cabinet type base at comfortable working height, and is especially suited for handling small, difficult work on a production basis. Another I have noticed really appears as a miniature replica of larger machines of highly competent type, and may be fitted with a special type of dividing head and centers for precision work on small gear cutting, spline cuts and similar work. This particular machine is a bench model.

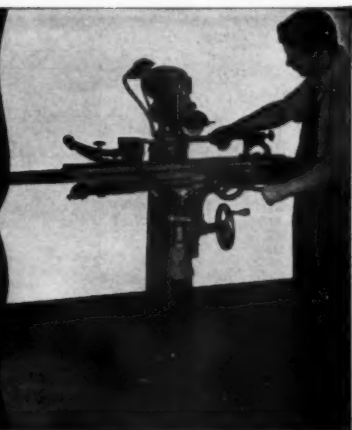
A good many of the smaller models of plain millers are made so that they may be mounted on a bench, or a cabinet base of bench height, at the option of the buyer. An interesting aspect of having a small miller set on a cabinet type base, with a convenient door letting into the front of the base, is that it may be used for storing collets and various attachments. Some of the better models are designed so that they may be used with a variety of standard attachments. One such, considered very good for tool room work, has 4 spindle speeds, and a 3-step V-belt drive for each spindle speed.

Do you know that it is possible to buy a bench miller in semi-finished form, with the major machining operations accurately finished, together with the necessary blueprints for finishing the jobs? Such bench mills are claimed to be entirely suitable for many purposes, and are of plain miller or knee and column type. I have not had the opportunity of seeing one of these in actual operation, however.

A small type of plain milling machine, which has recently undergone a great deal of improvement, has had handwheels attached to the leadscrews



# CONSERVE PRECIOUS TOOLS

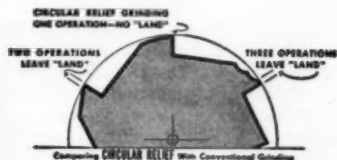


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Note from diagram how CIRCULAR RELIEF GRINDING follows the curve of the tool, grinds right up to the cutting edge, and does not cut away valuable metal supporting the cutting edge.

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Turning back the years to July 1899, here is the first shop of the Kearney & Trecker Corp., Milwaukee. Theodore Trecker (in overalls in the doorway) at 73 continues as President of the Company.




which provide the lateral and longitudinal traverse to the table, the handwheels replacing cranks that were formerly used. Both handwheels are located conveniently at front of the table, and the leadscrews in question have been fitted with double rows of bearings, and with special grease fittings on the nuts which engage them. This is a highly competent little machine.

Very often, certain features of small milling machines are left optional with the customer. There is, for instance, an excellent little plain miller of floor type which has a power feeding attachment for light production work, but which can be readily disengaged so that work may be fed by hand, by

means of a rack and lever assembly, when that is desired. There is an optional provision with reference to a coolant system for this machine. Twelve different spindle speeds may be had on this unit, by means of interchangeable V-grooved pulleys, and the spindle and jackshaft are fitted with tapered roller bearings.

The ability to set up a small plain miller of hand type quickly and accurately depends in a large degree upon the design of the machine itself, as well as upon the facility of the workman who is using it. In toolroom production, one machine of this kind that has been found especially good is fitted with micrometer dials for the table stop, for the vertical adjustment of the



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is made for the smallest tool room lathes as well as the largest railroad shops. Severe conditions are no hazard to the accuracy and long life of the large taper thrust and annular roller bearings. Precision mounted, front bearing cone seats on resilient pad—a shock absorber protection against tool breakage. Available in taper shank, slip in, slip over and spindle types. For unconditional proof, test in your own plant.

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will cut tool costs. A savings of at least 40% (some users report 75%) with this removable taper shank tool driver. It is used with taps, drills, countersinks, reamers, end mills, center drills, counterbores, woodruff cutters, etc. The sleeve is a two jaw collet in action, fitting over the diameter of the shank of tool, which is positively driven by flats or the tang on shank end.

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Hardened throughout, self-compensating for wear, precision built. For top production on small South Bend, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.



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*Manufacturers and Selling Agents*

knee and for the transverse movement of the saddle on the knee. These dials are sufficiently large and the graduations so legible that setups are speeded and made more accurate, and the machine has had considerable popularity as a result.

Very large cuts in brass, aluminum, and similar soft materials naturally do not indicate a heavy type of machine. Even a hand miller which is chiefly employed on this type of work may be lighter than models used on tougher materials. For such work, special machines have been devised and put into use. Small parts for radios, motors, etc., can be machined to advantage. This class of machines departs considerably from standard design, and cannot be considered as standard plain millers, but the units are very good for the type of work they are designed to handle.

An outstanding plain hand miller that came to my attention not long ago is fitted with a highly efficient auxiliary table feed that may be thrown into engagement at any time one wishes to go from hand to power feed. A 3-step cone pulley drive is provided at the rear of this machine, from which a shaft, fitted with universal joints, reaches forward to the table-feeding mechanism. This machine has its spindle mounted in Timken bearings, and can be had with a coolant system if that is desired. It bids fair to make

## **Screw Machine Cams**

**IMMEDIATE DELIVERY**

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:-

Chicago, Ill.

a sizable place for itself where small parts are milled in quantity at seasons, and small lots interposed where hand feed is indicated.

It will be appreciated, also, that these various small-sized machines, while they have a very definite and sizeably important place in industry, cannot be expected to deliver heavy-duty production, and there are many places where larger machines must be used in order to show production economy. Factors entering the choice of a machine always include the estimated cost of maintenance, and such loss as one must assume he will need to bear thru obsolescence. You will save money initially by investing in one of these smaller machines, but will you save when all of the economic factors have been figured in? If you purchase a machine that is far too large and expensive to do what work you have and keep relatively busy, you will lose thru over-tooling, but if you do not have sufficient machine capacity to take care of all your work, and leave you a comfortable margin of excess capacity, you will find yourself in a tight spot and facing a definite production loss when you become very busy. The latter is usually the worst kind of loss.

Assuming that your present milling equipment is a bit overburdened, it is quite possible that one or more of these smaller plain millers will be able to relieve your larger machines of some

# HANSEN ENGINE CLEANER



**O**VER A PERIOD of many years Hansen cleaners have established themselves as the top ranking spray cleaning units on the market. In the industrial as well as the automotive field they are an absolute necessity for thorough and efficient cleaning of parts, engines, anything in fact that can be cleaned with a liquid spray. Indispensable for spraying light liquids on machinery, parts, etc. Handles kerosene, light oils and cleaning fluids. Easy to operate, needle valve control, automatic shut off on handle. Sturdy, made of brass with nickel finish. Comes with six feet of  $\frac{1}{8}$ " metallic hose for liquid. Air connection furnished in  $\frac{1}{4}$ ",  $\frac{3}{8}$ " and  $\frac{1}{2}$ " size.

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### INDUSTRIAL *Air Line* EQUIPMENT

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CLEVELAND, OHIO

of the lighter work that comes along, and thus enable you to hold your production up to where it belongs. In the article to follow, I expect to consider larger and heavier machines, together with some of the auxiliaries and attachments that may be used with them.

#### EDITORIAL NOTES—

A hand miller with built-in coolant pump, piping, with motor in base, and with 6 different spindle speeds in each direction, is made by Atlantic Machinery Corp., 149 Broadway, New York City.

A machine which may be had with hand operated controls or with automatic feeds, considerably used for small parts production, is made by Atlas Press Co., 950 N. Pitcher St., Kalamazoo, Mich.

The machine which may be had with Timken roller bearings or ball bearings on the spindle, setting on a cabinet base, etc., is made by Burke Machine Tool Co., 297 East 16th St., Connecticut, Ohio.

The machine which closely resembles those of larger size in general appearance, and which may be fitted with a special type of dividing head and centers for small gear cutting, etc., is made by Elgin Tool Works, 1772 Berceau at Ravenswood Ave., Chicago, Ill. An excellent small precision milling machine is made by Hardinge Bros., Inc., Elmira, N. Y.

The hand miller models designed so they can be used with a variety of standard attachments as mentioned, having 4 spindle speeds, and a three-step V-Belt drive for each spindle speed, are made by Jefferson Machine Tool Co., 700 West Fourth St., Cincinnati, O.

The bench millers in semi-finished form, together with blueprints, etc., are furnished by Lewis Machine Tool Company, P. O. Box 116, Station A, Dept. Z-21, Los Angeles, Cal.

The hand miller on which handwheels have replaced cranks, and the leadscrews have double rows of bearings and special grease fittings, is made by Machinery Mfg. Co., 1915 East 51st St., Vernon, Los Angeles, Cal.

The hand miller of floor type which has a power feeding attachment for light production work, readily disengaged, on which there is an optional provision with reference to a coolant system, and on which 12 different spindle speeds may be had by means of interchangeable V-grooved pulleys, is made by Miller & Crowningshield, Greenfield, Mass.

The hand miller good for toolroom and small part production, and incorporating micrometer dials or readily legible type, is made by W. H. Nichols & Sons, Waltham, Mass.

The special machines developed for light cuts in brass, aluminum and similar soft material, is made by H. D. Rouse & Co., 2216 North Wayne Ave., Chicago, Ill.

The hand miller having auxiliary table feed with power obtained thru universal-jointed shaft, etc., is made by Wigglesworth Machine Tool Co., 191 Bent St., Cambridge, Mass.

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Keep machines going—production high—with BRADY-PENROD coolant and circulatory pumps, motor-driven. Equal efficiency maintained pumping water or light oil. Five models, with separate ratings established at 400 SSU, 750 SSU, 1250 SSU, 2000 SSU.

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$\frac{3}{4}$  H.P. motor replaces  $\frac{1}{4}$  H.P. through superior pump design. All motors have 20% surplus power.

Capacities:  $\frac{1}{4}$ " to 2" pipe, 4 to 100 gallons per minute. Pressure up to 100 feet head. Special models for larger capacities.

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**SMALL PARTS MILLING!**

**THE  
NEW NICHOLS  
HAND MILLING  
MACHINES**

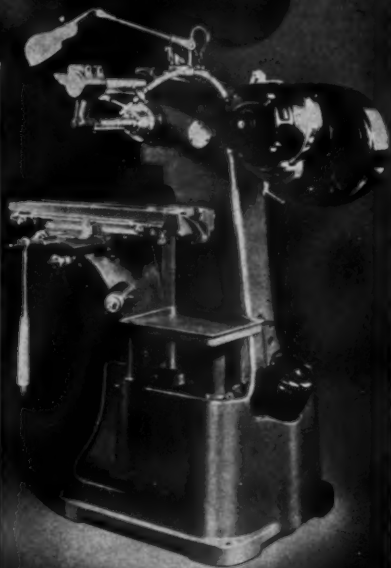
*Give you full advantage  
of high cutting speeds*

Engineered for volume production of small parts with high-production tool efficiency and economy • Speedy Set-up • High Precision • High Speed • Rugged design and durability make it ideal for small parts milling.

*May we send you illustrated bulletin?*

**SPECIFICATIONS**

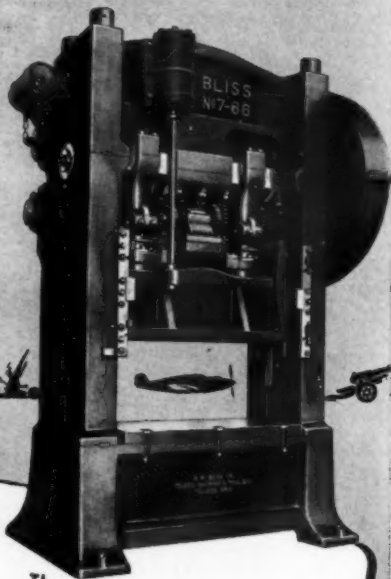
Longitudinal feed, 10". Transverse feed 7". Vertical feeds of knee, 13½". Vertical movement of head, 4½". Micrometer dials on Transverse and Vertical feeds. Spindle speeds 100, 200, 600 and 1200 r. p. m.



**W. H. NICHOLS & SONS**

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Torpedo Boats, Airplanes and Tanks, Gun Carriages, Jeeps, and other essential war materials require the fabrication of sheet metal in astounding quantities. The Bliss Double-Crank Press illustrated here so serves industry today in this vital processing that it literally stamps its way to victory.

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# BLISS



# Aptitude Testing

By M. G. HEUER

**N**EW uses for aptitude testing are coming out of the war emergency to solve the old problem of round pegs in square holes. In peace time, tests served industry to select the applicant with special skills, to reject those who did not "fill the bill." Today, when personnel men can't afford to reject any one who wants to work, they're of small value in selection. But they are of invaluable service in placing the workers available in the jobs to which they are best adapted. They're helping to determine where every applicant can give effective service—from the mental giant to the worker who is low on brains but who has some other skill that can be put to use in the war production program.

Among notable testers in industry today are Scoville Mfg. Co., United

States Gypsum, Elgin National Watch Co., Westinghouse, General Electric, Lockheed Aircraft, Woodward Governor Co., The Whiting Corp., and many others of equal eminence. One plant claims a labor turnover of one-half the national average since starting their testing program, and reports 9½ successful hirings out of 10, in contrast with an average of 6 out of 10 before testing. All of the plants using tests report success in picking supervisors who really can take over, in placing routine workers more effectively, and in selecting executives who have the power to handle key jobs, as well as in placing women successfully on jobs they've never done before.

Today's testing has been simplified too, so even small firms can use it, without facilities for giving elaborate

Paper and pencil tests offer a real advantage when time is precious. They can be given to one or a hundred at a time.



manual puzzles and machine tests to each applicant, and without psychologists on their own staff to evaluate results. Paper and pencil tests, carefully tested on thousands of workers doing similar jobs in other plants, can be given to large or small groups of applicants at very little expense or consumption of time, and sent to experts for scoring and analysis. Institutes specializing in such service are located in key cities throughout the country, and almost every university which has an engineering or psychology department can furnish information on how to proceed.



Any one can give the aptitude tests—but it takes an expert to interpret them correctly.

"We're finding these paper and pencil tests a big help in selecting supervisors from the ranks who have the leadership needed in handling men," says Ralph C. Kresge, personnel manager at Chicago's Link Belt Co. "Formerly, after an appointment was made, we often discovered that a man who was excellent at the bench was really weak on the traits needed for supervision—weak on personality, weak on handling men. We have many of these good conscientious workers — turning them loose on jobs they can't make good on is discouraging to them—and bad for us. Now, we can discover the possibilities before we shift."

Before the war, Link Belt built drag lines, shovels, conveyors, mining machinery, coal washers and tipples. When they began defense work more than a year ago, they added production of anti-aircraft gun carriages and tank turret platforms, and have more than doubled their working force. They put the question squarely:—How to pick men with a reasonable assurance that upgrading would work out successfully?

They got the answer from the Personnel Institute, Inc., a psychological service in Chicago for industry, schools, and individuals. Dr. Richard S. Solo-

mon, director of the Institute, selected a battery of 3 paper and pencil tests: a mental agility test to indicate whether an applicant could learn on the job, how far he could go in absorbing information and responsibility; a personality test to show how well he could work with others and on his own; and a mechanical aptitude test to indicate how handy the applicant was with tools and machines.

Now, when a man is considered for upgrading, he's asked to take the aptitude tests before possible promotion is mentioned. Then the tests are sent to the Personnel Institute for scoring. The results are discussed with the ap-

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"Airgrip"  
Deliveries  
SPEED LATHE  
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● Lathes are being shipped on schedule by builders who are taking advantage of the prompt deliveries of Anker-Holth high speed revolving air cylinders. We have rapidly expanded plant facilities to keep pace with the greatly increased demand for "Airgrip" air cylinders. *Many sizes can be shipped immediately.*

Above is shown a Lipe-Rollway Corp. assembly line, where Lipe Carbo lathes are

being fitted with Anker-Holth high speed revolving air cylinders. These lathes, now fitted with "Airgrip" collets, are producing over 25% more projectiles than would be possible with hand operated devices.

Anker-Holth manufactures a complete line of air cylinders; air operated three jaw chucks, expanding arbors and collet chucks; and, air filter, lubricating and regulating valve units.

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**"AIRGRIP" CHUCK DIVISION**  
**332 So. MICHIGAN AVE. • CHICAGO, ILL.**

plicant in a way that will not tear down his self-confidence, but will give him something constructive to work toward. If he hasn't the stuff for the specific promotion the company had in mind, that promotion isn't mentioned — but the scores are kept in a special file. The worker may be excellent material for another promotion that may come along.

"Taking the test doesn't leave us open to criticism from the men," said Mr. Kresge. "We've changed a number of people from clerical jobs to machine jobs and vice versa as well as upgrading in the shop. The rating is always the basis for a constructive interview, since most workers appreciate the chance to get ahead. If a man is weak on personality and his other scores are favorable for supervisory work, we sometimes put him on as supervisor, but suggest a course in public speaking, a personnel training course, or taking over club responsibilities of some kind. Or he may need special training for the promotion being considered — then we suggest a course he might take in war production training or vocational school.

Another company in the Chicago area uses the same battery of tests to place men and women as machine operators, draftsmen, and drill press operators—fields heavily depleted by war demands. The company ordinarily manufactures heavy machinery and other equipment for foundries, steel mills, shipyards, aircraft and chemical industries, and has more than doubled its working force since taking on war contracts. They give credit to their testing program for maintaining production levels even with green workers, for uncovering aptitudes for superior performance among men—yes, and women too.

This company discovered that a number of the women tested for drafting work scored higher than some of

the men who were considered. Margaret, for instance, was a file clerk at the plant, who had taken several courses at the Art Institute after finishing high school. Her personality was not arresting enough to bring her to management's attention, but when she read the bulletin board announcement that the company was looking for girls to train for jobs in estimating, drafting, and engineering, Margaret asked to be considered. Here's how she showed up:

Mental ability 92 high; General mechanical ability—Size discrimination 95 high; Spatial perception 22 below average; Manual mechanical ability 3 low; Blue print reading 85 well above average; General mechanical aptitude 34 slightly below average; Personality inventory—Extroversion 36 slightly below average; Dominance 36 slightly below average; Self-confidence 47 average; Social independence 87 very high.

The interpretation of those scores is important, and needs to be done by a trained psychologist. Here, in part, is the deduction made on Margaret by the Personnel Institute.

"Miss S should be able to learn rapidly in new situations and to assimilate new material of a complex nature . . . She is below average in spatial perception and weak in manual dexterity and general shop orientation, but her ability to read and understand blueprints is well developed, and she possesses relatively high size discrimination. With adequate training we would expect her to develop well above average proficiency in connection with mechanical drawing."

Notice the low scores in Margaret's personality inventory, and the high score in social independence. Here's how the Personnel Institute's psychologist explained them:—"Miss S is likely to be slightly resistant to supervision that is too direct, since she probably prefers to do things in her own way

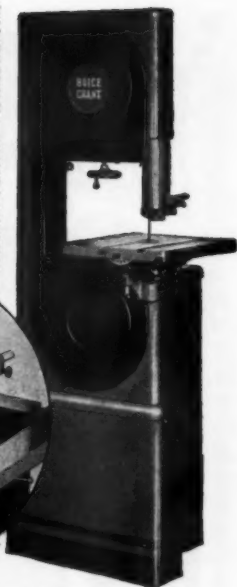
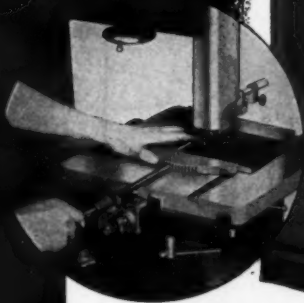
# NEW LOW-COST 14" BAND SAW

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CONTOUR  
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It Is Also  
An All-Purpose  
Cut-Off Machine For

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BRASS & COPPER  
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Throat depth—13½". Under Guide Clearance—8½". Blades, width—¼" to ¾" wide; length—98". 8-Speed Gear Box Drive—92, 128, 183, 250, 1650, 2420, 3260, 4100 ft. per minute. Micrometer Set Blade Guides with New type jaws. Height—67". Floor Space—27½" x 29". Weight—365 lbs. Model shown \$214.50, F.O.B. Factory with ½ h.p., 1 ph. motor. Blade Welder for inside cutting, \$90.

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The Boice-Crane is designed for use anywhere in the plant. Stands the gruelling pace of production line or foundry. Meets exacting toolroom needs.

Makes straight, angular and contour cuts. Beats milling machine and shaper time roughing out dies, cams, punches, and odd-shaped assembly parts.

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Many times faster on a host of jobs usually done on other equipment, and at a fraction of their cost. The Hammond "600" put to work will save hours of your other valuable machining time. It's a new high-speed machining method to help you "beat that delivery promise."

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EALAMATOO, MICHIGAN

Eastern Branch - 71 West 23rd Street, New York, N. Y.

and on her own initiative. She may require some special handling from time to time by management, but in other respects she has rather well developed potentialities for her contemplated advancement."

Margaret's superiors confirmed this analysis. Margaret is now doing excellent work in a defense training course in mechanical drawing and has already been transferred to the drafting department of the firm.

George, a blue print boy in the same firm, had such a likeable personality that he was considered for promotion. Tests, however, showed that his mental ability scored 23, considerably below average. But he scored 90 in size discrimination, 72 in blue print reading, both above average scores. In general mechanical ability he came out with a 58, an average score. His score on manual mechanical ability was 20, well below average. Here are his personality scores:—

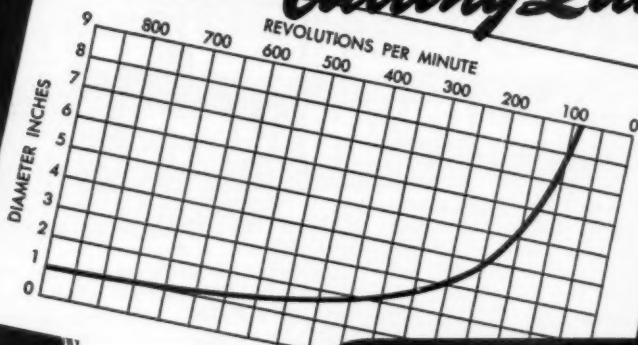
Extroversion 75 slightly above average; Dominance 60 average; Self-confidence 65 average; Social independence 8 low.

George didn't get the promotion, and no hard feelings were stirred up by exposing him to a situation in which he would fail. He is continuing to do satisfactory work at his old job.

Bill's ability to do superior work, on the other hand, was discovered thru aptitude tests. He was hired one year ago—and went from blue printing to estimating work in 2 weeks, in a few months to the drawing board doing drafting and junior detailing. Without the tests he might have been put on a routine job in the shop at which his abilities would not have shown up, or he might not have been hired at all.

Bill applied at the plant a year ago when he had just graduated from a technical high school at the age of 17. There was no opening, but Bill was invited to take the tests. Here's

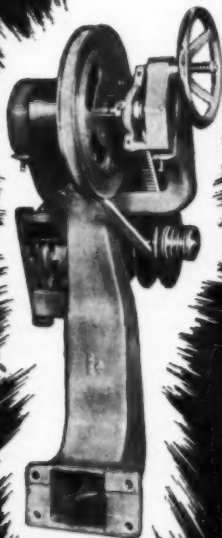
Chart Calculated for 200 S.F.P.M.



## Cutting Quiz:

### HOW MANY S.F.M. FOR CAST STEEL?

(Using Carbide-Tipped Cutters)



Cutting cast steel with carbide inserts is recommended as follows: rough turn at 150 to 180 S.F.M., finish turn at 200 to 250 S.F.M. These high surface speeds often demand top R.P.M. from old equipment on ordinary diameters and impossible speeds on small diameters. But the Given Vari-Speed Drive supplies the extra R.P.M. to lift your old machines into efficient cutting ranges regardless of work sizes. And don't forget—you get another advantage: penetrating the hard, abrasive cast steel scale at a safe speed, then with a quick spin of the handwheel, shooting the R.P.M. up to the most efficient production level.

The Given is designed to fit any tool! Send us your list—get our recommendations and bulletins.

## VARI-SPEED DRIVE

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# Given

how he came out:—Mental ability 99; General mechanical ability—Size discrimination 99; Space perception 80; Manual mechanical ability 75; Blue print reading 99; General mechanical aptitude 99;

Personality inventory—Extroversion 78; Dominance 60; Self-confidence 74; Social independence 18;

Those low scores in the personality inventory? Actually, all except the 18 in social independence are above average. Too high, they'd indicate a fellow who couldn't take direction, who wouldn't know how to keep his own counsel when he had an idea for doing a job that was opposed to what his supervisor thought. In the Institute's words:—"Bill should be responsive to training and supervision, and we believe will exhibit at least average drive on the job."

For executive jobs, aptitude testing has been found even more valuable

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than for regular bench jobs. As the personnel manager of one plant which started its testing program at this end put it:—"If you make a mistake in hiring a \$7,000 a year man, it's a bigger loss from the cost angle than if you make a mistake with a man at the bench,—though not, of course, in the human value."

Several years ago, this firm needed engineers with sales ability to work with aircraft industries on the west coast. The Personnel Institute sent a more comprehensive battery of tests to the plant than those used for shop workers. In addition to the mental agility, personality, and mechanical aptitude tests, there were tests for measuring vocabulary, judgment, and social tact. One applicant was so good on the tests that he finished ahead of time and pointed out an error in the questions. He showed up as a perfect genius of an engineer. His personality scores, however, indicated that he would never be a leader. He was put on the job anyhow, but in a year he had to be taken off, because he wasn't accomplishing anything. He was transferred to the plant as a technical engineer and is doing an outstanding job.

Another engineer who took the tests showed remarkable aptitude for selling on the personality inventory, even though he had never done a day's selling in his life. When he was sent to the coast to sell the firm's services to



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This is no time to compromise with production. Speedy, accurate heat treatment is needed to achieve the output of tool and dies scheduled for this year.

Actual reports show that greater production of tools, dies and precision parts is attained after the installation of Despatch furnaces.

Investigate the advantages of Despatch heat treating furnaces for your plant. 64 standard models, gas or electric, pot type or batch type furnaces available for prompt delivery. Also special models to suit any material handling necessary.

Wire—phone or write for a Despatch engineer to recommend the proper heat treating furnace for your plant.



Despatch Batch Type Furnace, gas heated, processing steel springs in a midwestern metal plant



Battery of Despatch Pot Type Furnaces, electrically heated, processing bearing parts at a large eastern plant

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**OVEN COMPANY MINNEAPOLIS, MINNESOTA**

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4 arms, 51" high, stacks 10,000 lbs.;  
5 arms, 57" high, 12,000 lbs. flat or  
round stock. Pipe or tube, less weight.  
3 stands for 20' lengths; 2 for 12' or shorter.  
Use against wall or back to back in  
center of room. Cost is small, value big.

Write for circular and prices.

Priority Regulations govern delivery.

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GREATEST  
CAPACITY  
SMALLEST  
FLOOR SPACE



airplane companies he did a whale of a good job and is continuing to do so.

That doesn't, of course, minimize the value of mental ability. It merely proves that intelligence is not the only thing that matters. And this applies to jobs in the shop as well as in the executive positions.

"On many occupations," reports one handling war contracts, "we have found that people with exceptionally high scores were dissatisfied with monotonous work and in some cases were even failures. Only recently we had to reduce the maximum scores allowable on certain tests because the men we had been putting on certain shell unloading jobs were too smart to be satisfied for any length of time with the routine."

Interest in general intelligence tests in industry increased rapidly after World War 1, when use in the army and navy showed their possibilities in selecting men who could take responsibility. Today more than a third of the larger companies use some type of mental test in general hiring. But more and more personnel men are recognizing that mental tests are not enough—that a "general profile" showing other aptitudes is needed to utilize men and women in industry to the best advantage of management—and individuals.

"Don't let your prejudices or other people's influence you against considering aptitude tests," urges Link Belt's Personnel Manager Kresge. "Try

some of them yourself—not for selecting workers in the war production program, but for placing them in the spot where they can do the most effective job."

If your experience matches up with others, the "something new" you've added to your hiring procedure will help build up self-confidence and good will in your plant—and, just as important, will help to spur production to the higher levels needed for industry to succeed in the war effort.

### Marking-Device Catalog

For those with problems involving such marking devices as steel stamps, name-plates, branding devices, metal tags and labels, shipping room gadgets or other marking equipment, new catalog by Dickey-Grabler Co., 10308 Madison Ave., New York, affords a full line. There are steel stamps for machine use; shank, insert, knurling dies, roll marking dies, hammer stamps, steel typeholders, alphabet and figure sets, etc., practically to suit all needs.

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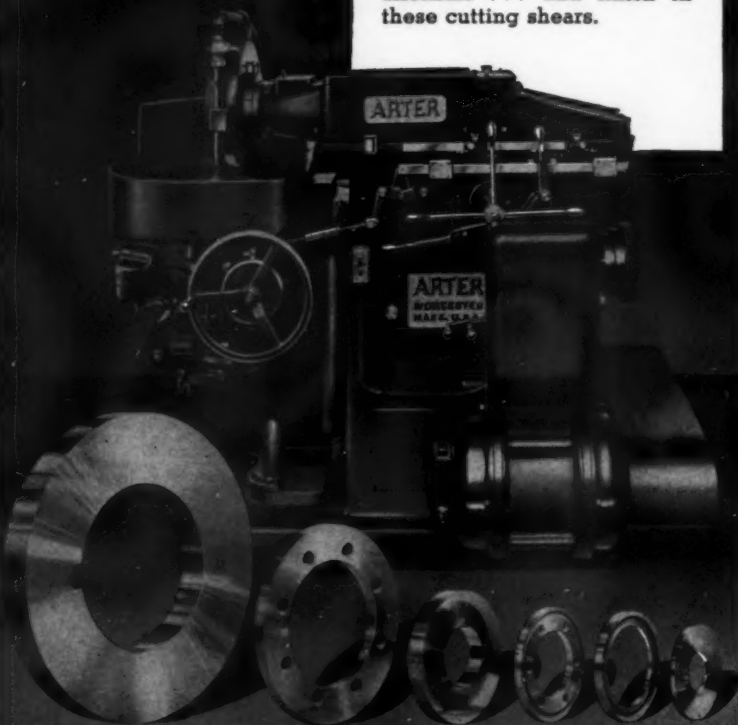
Products Engineering Company's quick acting jig clamps are the only drop forged clamps available—they're stronger—have exceptional opening and closing speed and a positive lock impervious to pressure and vibrations—it pays to specify them. Available in many models and sizes from midget to 6" clamping bars. Send today for file size catalog.

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# Positioners Speed Welding

By CARLETON CLEVELAND

**W**ITH the spectacular advance in production welding, particularly on war production, when ships, tanks, and other ponderous products are being fabricated, the correct positioning of huge, heavy, and awkward shaped pieces is of vital importance. Welding speeds up war work, saving time and labor, but it also saves metal, and gives greater strength and rigidity to construction. The welding positioner is therefore proving itself of inestimable value, reducing setting up time of work preparatory to welding operations right now, when time saving is so vital.

The welding positioner may be used to provide complete maneuverability of even the most cumbersome weld-

ments with a minimum of handling. Once a piece of work has been placed on the positioner table and securely bolted and clamped, it may be rotated at either a variable or constant speed, or it may be tilted in any desired position to suit the welder. These movements are controlled by hand wheels and self-locking gears in the manually operated machines, or by independent motors with magnetic starters and push button controls in the power operated machines.

In shipyards, where numerous welding operations—the welding of steel pressure pipe fittings and other parts—must be done in record time, the positioners have greatly expedited the work. In other plants where built-up



Three 8-ton Positioners handling Diesel engine crankcases and speeding production.

Operator working from platform of Portable Lifter; the large steel frame mounted on a 6,000-lb. capacity, power operated C-F Positioner



steel gear blanks must be welded, large savings have been effected. With a piece of work on the positioner the



Locomotive crane carbody securely mounted on a 6,000-lb. capacity, power operated C-F Positioner. Operator has complete supervision of Positioner movements thru push-button controls seen just beneath left foot.

welder does the positioning himself, and while the welding operation is going on no crane time is tied up. There's no loss of the crane operator's time, waiting for work to be completed; nor does the welder have to stand around waiting for the crane to get the work into the proper position. Particularly useful is the positioner when several weldings must be made on one piece. In such case, by merely turning a wheel the welder can bring the weldment into any required position.

In the welding of circular shaped pieces, a variable speed connection for table rotation provides for an unusually wide range of work, resulting in faster operation and better welds. A large builder of chemical process pressure vessels and tanks makes extensive use of this method. In another plant, hard surfacing of valve seats and rings with stellite or similar facing is readily applied by placing the work on the positioner table and adjusting the rotating speed to obtain a uniform movement, eliminating unnecessary material waste and reducing grinding operations to a minimum.

Pieces of irregular shape are easily



## Finger-Tip or Push-Button CONTROL of MASSIVE MACHINE MOVEMENTS

### with NOPAK Operating VALVES

The application of air or fluid power to heavy, cumbersome machine movements is giving old machines new life, new usefulness, greater capacity to meet war production quotas.

NOPAK Air or Hydraulic Cylinders controlled by NOPAK Operating VALVES are used to actuate clutches, chucks and clamping devices; to move or hold materials, dies or tools in position on highly diversified machine operations. Physical strain and exertion are replaced by push-button, foot-pedal or finger-tip control. The elements of human error and fatigue are minimized. Skilled labor is released for more exacting work, as inexperienced men or women are readily trained to operate your modernized equipment.

If you have machines in your plant that might be converted to push-button or fingertip operation, write today for complete data on NOPAK Control Valves, NOPAK Air and Hydraulic Cylinders.

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NOPAK 3- and 4-Way Hand Control Valves are known for their easy, finger-tip operation on air or hydraulic installations.



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rotated and tilted into desired positions, so that all welds can be made down-hand, in which case larger welding rods can be used with higher currents, and fewer passes, thereby saving precious time and bringing down production costs, and producing smoother and stronger welds. There is practically no limit to the heavy awkward loads (when mounted on the positioner table) that may be moved about with comparative ease, the operator controlling the movements by push buttons located nearby. Even hand operated positioners are found to speed up welding that would otherwise be slow and tedious.

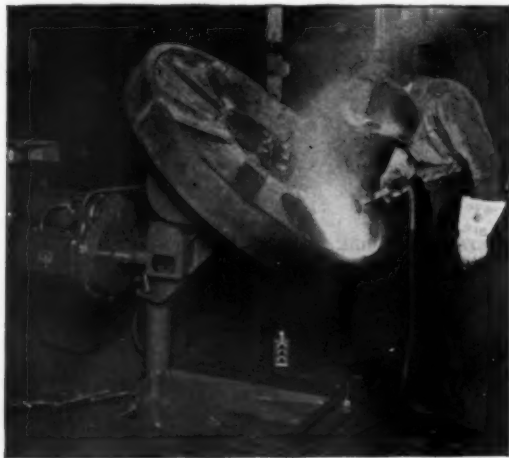
Without convenient means of maneuvering large and bulky loads in production welding, the shifting of these pieces to proper position for suitable welding is often extremely difficult and costly in both time and man power. Once mounted on a welding positioner, top, bottom, sides, and ends; inside and out; any surface or angle are accessible for every weld.

Providing the proper approach to all sides of a welding job, the table of the



Welding a large sprocket mounted on a hand operated Positioner of 2,500-lb. capacity.

positioner revolves, under various controls, in a complete circle. On certain



Welding a large flywheel on a power operated, 1,200-lb. capacity Positioner.



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## SPECIFICATIONS

Table feeds— $\frac{3}{8}$ "  $1\frac{1}{8}$ "  $1\frac{3}{8}$ "  $1\frac{1}{2}$ "  $2\frac{1}{2}$ "  $3\frac{1}{2}$ " per minute.  
Work spindle speeds 73—104—144—213—294 rev. per minute.  
Wheel spindle speeds 2750 R. P. M.  
Spring action tail stock.  
Capacity  $\frac{1}{8}$ " to 7" diameter,  $\frac{1}{4}$ " to 11" length.  
Wheel 10" by  $\frac{1}{2}$ " by 2".  
Tank capacity  $3\frac{1}{2}$  gallon.  
Spindle motor  $\frac{1}{4}$  HP, AC, 60 Cycle, 110, 220 volt.  
Wheel head motor—1 HP, AC, 60 Cycle, 110, 220 volt.  
Regular equipment includes emery wheel, diamond wheel dresser, belts and wrenches.

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units the positioner table and its integral mechanism are adjustable in height, this being accomplished by sliding the unit up or down on a base column, pinning it at the desired height. The table-tilting feature of the positioner gives the machine its final utility, a maneuver which provides for turning a weldment almost upside down — from horizontal to 45 degrees beyond vertical — without changing the work from its original set-up on the table.



Handling a heavy machine base on a 3,000-lb. Positioner, saving some 30 per cent in welding time over the old method.

In handling long piping, tanks, or other extensions requiring an end support, suitable stands are available for supporting the extended end of any such

weldment. Pieces as heavy as 7-tons or thereabouts can be maneuvered with safety and convenience bringing the work into exactly the right positions.

The use of cranes in the welding departments has been greatly reduced wherever positioners have been installed. Even steel drums approximately 14 feet in diameter, massive tank sections and other bulky and unwieldy pieces extending far out from the positioner table top, can be handled on the larger units.

Many of the heavy-duty positioners, due to the cumbersome pieces that must be manipulated, are permanently fixed in the shop, several methods being used, one of which is to mount the positioner on a sub-base of girders of suitable size, which in turn is securely anchored to a reinforced concrete pit foundation.

One other factor as to the advantage of using positioners that must not be overlooked, is that of safety. With them, there is less shoving of heavy steel masses and shunting of them on the shop floor, eliminating the potential accident hazard of weighty objects coming in contact with other objects, persons, or other valuable equipment; less handling of slings and chains; and less chance of accidents or damage to the parts to be welded.

(Photos—Courtesy Cullen-Friedstedt Co., 1321 S. Kilbourn Ave., Chicago and Ransome Concrete Machinery Co., Dunellen, N. J.



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To see errors in dimensions as small as only .0002" or even as large as .002" by depending upon one's sense of touch alone is leaving a great deal to chance. Sense of touch cannot be magnified but vision can be magnified so that we can see errors quickly and accurately.

Visual or Dial Indicator Type Gages enable you to inspect several dimensions simultaneously and to determine the relationship of dimensions with each other. Here concentricity of the outside diameter is checked with the inside diameter. The lower indicator checks the squareness of the end with the axis of the inside diameter and the latter is checked for its own accuracy of diameter, roundness and taper. Try to do this with a "fixed" gage.



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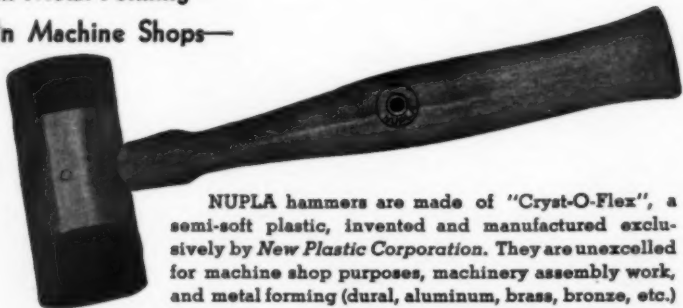
# NUPLA PLASTIC HAMMERS

## SAVE TIME AND MONEY

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In Metal Forming—

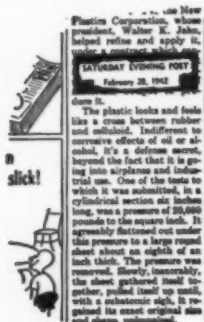
In Machine Shops—



NUPLA hammers are made of "Cryst-O-Flex", a semi-soft plastic, invented and manufactured exclusively by *New Plastic Corporation*. They are unexcelled for machine shop purposes, machinery assembly work, and metal forming (dural, aluminum, brass, bronze, etc.)

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## TWO HARDNESS GRADES:

Grade A—General Machine Shop Use.

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1-3/8"  
1  
1

### WEIGHTS

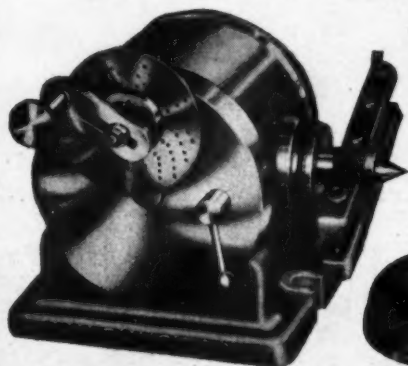
15 oz.  
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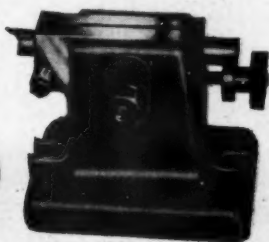
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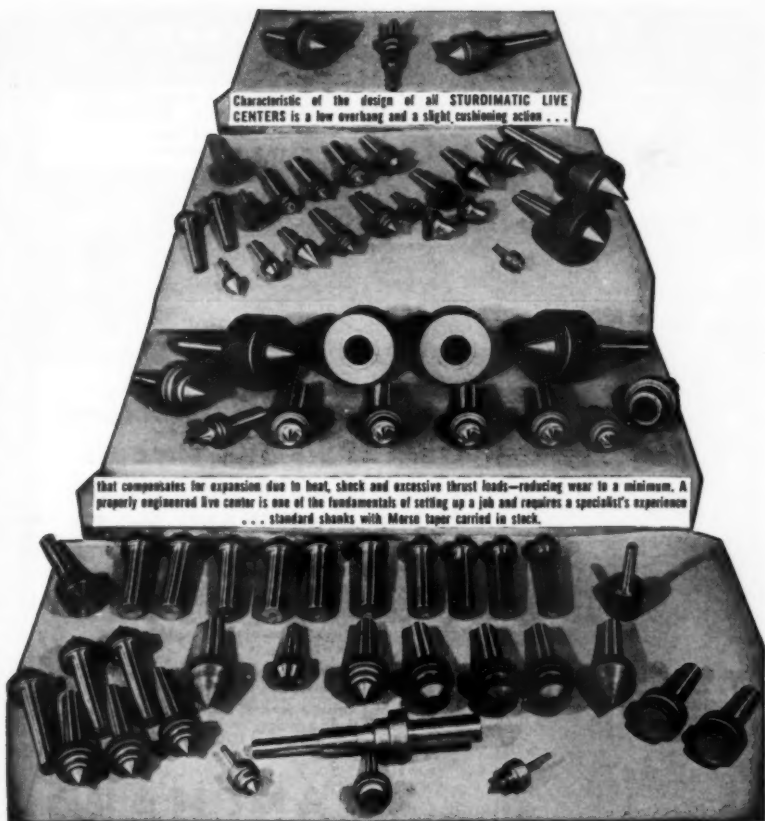
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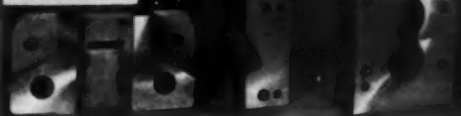
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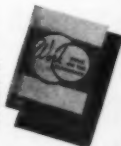
The cylinder wheel covers the entire surface at every revolution of the work. High work speed and ample supply of coolant eliminate any danger of heating the work. The Blanchard is a heavy and rigid machine, permitting the economical use of free, soft cutting wheels.

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# Harvesting the Scrap

By PAUL C. CABOT\*

**T**O move every pound of critically-needed waste materials into the flow for the manufacture of implements of war, is the over-all objective of the Salvage Branch of the Conservation Division, WPB. To make every man, woman and child in America conscious of this need, and to enlist the active cooperation of every American to "get in all the scrap—NOW", is equally important.

The steel mills of America are doing a grand job to keep our war production on the schedule established by Donald Nelson. However, it was divulged at the Newspaper Editors' Meeting in Washington that there is an inadequate inventory of iron and steel scrap in the hands of consumers.

It has been determined that if our production schedule is to be maintained, 17,000,000 net tons of purchased iron and steel scrap are wanted in the second half of 1942 to give the iron and steel furnaces sufficient inventories to prevent shut-downs when the cold weather sets in.

The WPB, thru its Salvage Branch, approaches this problem of "getting in the scrap" in 4 major directions, viz., thru:

(1) The Industrial Salvage Section, which is charged with the responsibility of educating industry to salvage

all critical waste materials, to speed up the return of these materials into the war production stream and to help industry to use established channels of disposal.

The present immediate objective of the section is to urge and assist the executive management of every industrial establishment in the country to locate, classify and move into war production channels all dormant and production scrap in their possession as



Just a small phase of the many effective General Electric salvage operations.

---

\*Deputy Chief, Conservation Division  
War Production Board

## **SPEED PRODUCTION -**

### **INSURE SAFETY WITH SHIFTWEIGHT WIRE REELS**

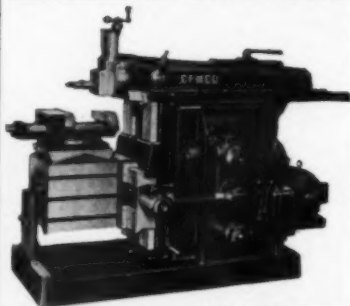
Husky, welded steel construction with a capacity to handle up to 500 pound wire coils with coil arms adjustable from a minimum inner coil diameter of 10" to extreme diameter of reel. Shiftweight is snapproof and easily handled by one man. Operates smoothly and will give years of trouble-free service. Immediate delivery from stock.



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speedily as possible. "Dormant" scrap is defined as obsolete machinery, tools, equipment, dies, jigs, fixtures, etc., which are incapable of current or future use in the war production effort because they are broken, worn-out, irreparable, dismantled or in need of unavailable parts necessary to practical re-employment.

Hamilton W. Wright, Chief of the Industrial Salvage Section, says to industry: — "Worn-out, unusable material, machinery and equipment must be reborn in America's furnaces, smelters and refineries. Only by this method can we obtain sufficient raw materials required to produce urgently needed armament for our fighting forces."

Representatives of the Industrial Salvage Section in all parts of the country are urging industrial firms to appoint an executive as salvage director, put into motion a practical, continuing salvage campaign and to adopt the policy:—"If it hasn't been used for 3 months, and if someone can't prove that it's going to be used in the next 3 —find a use for it or 'scrap' it."

(2) The General Salvage Section is charged with establishing salvage programs in local community areas, appointing local committees and directing their activities. Their salvage operation extends to every household including farms, all retail stores, garages, hotels, small businesses and the smaller industrial organizations in rural areas.

The General Salvage Section, aided by the farm implement manufacturers, has created a well conceived plan to harvest all the scrap from every farm in the country. A far reaching campaign which will involve all the teachers and school children of the country has already been put into action and will extend its influence in every home in the country. The oil, rubber, automotive and steel industries and their

**THE QUICKEST WAY  
TO SPOIL GOOD  
BROACHES...**



*... Lean them against  
each other in a corner*

*How to get more production  
with your Broaches-----*

**1. BY PROPER HANDLING**

**I**T TAKES time to recondition a damaged broach. Careless handling of your broaches may tie up production. Here are a few good rules to follow to protect these vital war tools:

(a) Always provide individual storage racks for broaches. These should either be of a material that will protect the teeth from damage or else should be lined with such material. If cutting edges of broaches are allowed to strike against each other they may be chipped or nicked.

(b) Never drop a broach on any hardened surface. Broaches are usually made of high speed steel and may even be tipped with tungsten carbide. You may chip, nick, or even break the teeth.

(c) When broaches are to be stored for any period of time they should be treated to protect them against corrosion.

(d) Equipment for moving broaches from one department to another should have separate compartments to prevent nicking of broach teeth.

COLONIAL broaches are designed to enable you to machine your parts more accurately, quicker, and at a lower tool cost per piece than with virtually any other method of stock removal. Give them a chance to do an all-out job for you. Handle them carefully.

**colonial** BROACH COMPANY

*Broaching Machines*



*Broaches-Broaching Equipment*

DETROIT.....U. S. A.

dealers, as well as numerous other private and public agencies, are working thru some 12,500 state and local salvage committees in their efforts. The newspapers of the country have assumed responsibility of vitalizing all of these activities.

(3) The Special Projects Salvage Section is responsible for salvaging large accumulations of secondary and waste materials that are tied up due to financial, legal, political, and other reasons and which cannot be quickly handled by other Sections in the normal course of operation. Special projects include such things as abandoned railroads, streetcar lines, factories, bridges, etc. Recently the Metals Reserve Co., at the request of the Conservation Division, set up an organization entitled War Materials, Inc., for the purpose of salvaging iron and steel scrap which cannot be topped within existing price ceilings. The War Ma-

terials, Inc., will work in cooperation with the Special Projects Section and it is expected that the tonnages of so-called marginal scrap will greatly expand as a result of this new organization.

(4) The Automobile Graveyard Section, now working thru 254 field representatives, has the responsibility of seeing that 20,000 graveyards in the U. S. are functioning as producing units. With the help of the steel industry, nearly all regions of the country have been placed on a 60-day plan. This means dealers and brokers have been told that graveyards have been informed they must break up and sell their inventories within the same period. It is essential to keep these graveyards as operating scrap producing units. Most people mistakenly believe that best results are obtained by the elimination of automobile graveyards. In view of the fact that anywhere from 1,000,000 to 2,500,000 cars annually come off the roads and enter graveyards, it is essential that they be kept in operation as an important continuing source of scrap metal supply. To keep these operations in existence, it is as essential that they have an adequate inventory as it is that any other industry maintain a reasonable inventory.

### Non-Springing Collet

Danger of springing or vibrating open is claimed to be eliminated by a positive precision ball lock in a new collet closing attachment developed by Western Aero Products Co., 9211 W. Palm Ave., Burbank, Cal. Quick-closing draw in collet attachment is said to make a production screw machine out of an engine lathe by permitting feeding of material thru head stock without stopping lathe.

Immediate delivery is offered on the attachment which comes in  $\frac{1}{2}$ " collet and  $\frac{3}{4}$ " spindle size to fit Atlas, Clausing, Logan, Sheldon, South Bend, and similar lathes.

### GRAHAM MULTI-PURPOSE VISE



Today this versatile vise is practically indispensable for special-holding and duplicate-operation jobs on miller, drill press, radial, grinder, shaper, planer-

### KNURL HOLDER FITTING LATHE TURRET



Makes straight, checkered or spiral patterns using only a pair of straight-cut knurls. Adjustable for work up to  $2\frac{1}{4}$ " dia. Shank to fit your turret.

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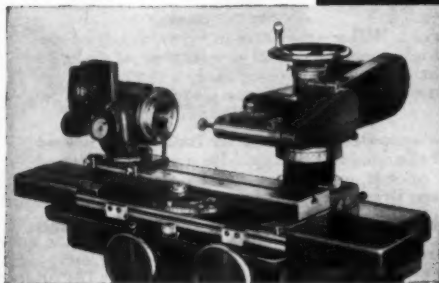
**THE GRAHAM MFG. CO.**

53 BRIDGE ST. EAST GREENWICH, R. I.

# *New* VERNON UNIVERSAL tool and cutter grinder

Designed for fast accurate sharpening of milling cutters, reamers, hobs, and similar tools and for miscellaneous cylindrical and internal grinding.

Extremely sensitive table action imparted by ball bearings rolling on hardened steel ways, which are ground in position. Table swivels 45° each side of zero setting.



Full line of attachments cover every tool room requirement. Ask for new bulletin!

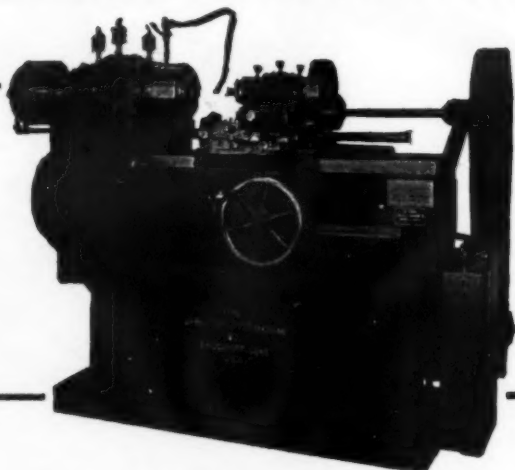


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*Vernon Line of* **HORIZONTAL MILLS, VERTICAL MILLS & JIG BORERS, 11" SHAPERS & GRINDERS**

**Keep Ahead of DEFENSE DEMANDS  
on the PRODUCTION of  
EXTERNAL and INTERNAL THREADS**



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7 $\frac{1}{2}$ ; minimum hole depends on smallest hob practical.

*Send for Descriptive Bulletin giving full information.*

*The James* **COULTER** *Machine Co.*

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# "Keep 'Em Working"

**R**UNNER-UP in importance to production in winning wars, is conservation. The longer that things produced can remain in efficient service; the less the strain on productive power and national economy. The lessons of conservation, applied to high - cycle air and electric tools, are being put over with telling effect by a plan originated by Rotor Tool Co., 17235 Euclid Ave., Cleveland, according to H. P. Bailey, President.



The broad, general plan for maintenance is the same for air and high-cycle tools. "Interest must be aroused in the importance of proper maintenance, to keep tools running at full efficiency and eliminate breakdowns", says Bailey. "Information about proper detailed maintenance procedure must be presented in attractive form. The service engineer must back up the plan by actually contacting maintenance men, making sure that they have proper detailed literature and equipment showing how to perform the duties of their jobs."

First phase of the plan was disclosed in the Sept. issue. It dealt with Air Tools. The section just released concerns high-cycle electric tools. A colored wall chart impresses upon executives and key men importance of maintenance. The booklet covers in greater detail aspects presented in the wall chart. The firm's service engineer takes the material to the maintenance man, cooperates with him, and shows him how to do the job, supplying him with necessary parts-sheets, such as supplied by all makers of portable tools.

Wall chart and booklet "Keep 'Em Working", covering the 2nd phase, on high-cycle electrical tools, has a slight change in approach, brought about by Rotor Tool's field researches, according to Bailey. It emphasizes importance of periodic check-ups of equipment, to nip electrical failures in the bud. Current adjustments providing proper voltage





Systematic Sam says: "A simple card file tells me when to check these tools"



Wise Willie says: "I keep the switch terminals and inside of handle coated with Glyptal Varnish"



Smart Steve says: "My eyes are valuable to Uncle Sam, as well as to me!"

to insure efficiency in the tools are suggested as a concern of the electrical engineer, who too frequently does not consider such adjustments as part of his job. "Keep 'Em Working" therefore contains a section for the electrical engineer. Procedure suggested for him is said to be very effective in directing his attention to the simple things he should do to maintain greatest efficiency in high-cycle electric tools.

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"We are finding an interesting and enthusiastic response to the plan in both fields", Bailey said. "But we regard the presentation only as an effective approach to secure serious consideration of the problem. We are relying upon our own service men really to do the job. They are the men who really take off their coats, get down to business with individual maintenance men, tell them the story all over again, and get results. They often have to do this with the maintenance men on different shifts and in different departments."

A vital feature of the plan, pointed out by Bailey, is for service engineers to impress upon maintenance men the importance of their position and responsibilities, as well as management's awareness of that fact.

### Adjustable Hollow Mills Catalog

Gen-see Mfg. Co., Rochester, N. Y., announces for distribution new catalog covering its adjustable hollow mills, facing and counterboring tools, and special production tools. Established, 1908, this is the firm's 42nd catalog issue. Claimed as ideal tools for finishing forgings, castings, etc. The hollow mills are quickly adjustable to .01" and can be fitted with drills, reamers, and have formed blades which can be ground to any angle to point work and short turn tapers. Styles are available for either brass, bronze, cast iron, etc., or steel and other material requiring a rake angle.

# WAGNER *can kill* WAR INDUSTRY'S NEED FOR DEPENDABLE MOTORS



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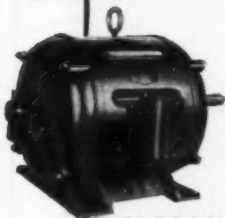
Write for your copies  
of Bulletins MU-176,  
MU-182 and MU-183



It takes plenty of dependable motors, operating at top efficiency, to maintain the high-speed production so necessary in our "all-out" war effort.

Wagner fully realizes this, and is working day and night turning out more motors now than ever before, and is supplying these reliable motors wherever they are needed to help our country on to victory.

If you need motors to carry on your war-material production, consult Wagner. Twenty-five sales and service branches, located in principal cities, are ready to help you in selecting the RIGHT Wagner motor for the job.



BM42-32A

Type RP Squirrel-Cage motors are used on machine tools and other electrically driven equipment that operate in clean, dry locations. 1/6 to 400-hp, 25 to 60 cycles, 2- or 3-phase.



Type HP motors are ideal for machines located where inflammable materials and substances are handled or manufactured. 3/4 to 125-hp, 2- or 3-phase, 25 to 60 cycles.



Type CP totally-enclosed fan-cooled motors are widely used on machine tools where dust, dirt, filings, chips, fumes or other destructive elements are prevalent. 1-1/2 to 125-hp, 25 to 60 cycles, 2- or 3-phase.

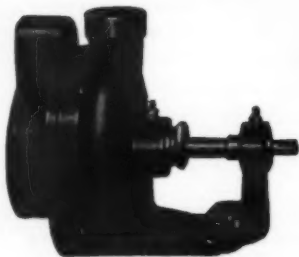
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6400 Plymouth Avenue, Saint Louis, Mo., U.S.A.

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—to highest quality, intelligent designing, honest materials and highest standards of production and inspection. In this way, we too take our place in the war effort . . . a position established for many years.



MODEL FRS4



### CENTRIFUGAL COOLANT PUMPS

Constant, uniform flow of coolants to increase efficiency. There's a Fulflo model ready for your requirements or specially designed to serve you best.

Pipe sizes  $\frac{1}{4}$ " to  $1\frac{1}{2}$ ".

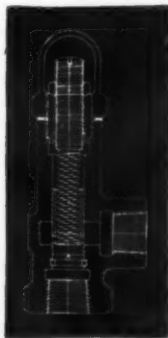


### BY-PASS OIL-RELIEF VALVES

Pipe sizes  $\frac{1}{4}$ " to 2", for pressures 0 lb. to 350 lbs.

Install these valves and that's all the attention required. No maintenance, no bother, no worry. Five different springs regulate variation in pressure.  
Cast iron or brass bodies with brass, hardened or stainless steel pistons.

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**Specialties Co., Inc.**  
BLANCHESTER, OHIO

# Surface Broaching "Con" Rods

**S**URFACE broaching all 4 sides of articulated connecting rods for radial engines in 4 passes on 2 machines is a recent development in materially reducing the time required for machining important components of engines needed for the war effort. With this process only 11 seconds are required for each of the 4 passes, or a total cutting time of less than three-quarters of a minute. The inserting and removing time to and from the fixtures is also low, due to their design and the type of broaching machine used. Both fixtures and broaches were manufactured by the Colonial Broach Co., Detroit.

The parts are broached directly from the "as forged" condition on 10 ton, 66" stroke Colonial single ram broaching machines. Two fixtures are used, one for broaching the sides parallel with the hole openings and the other for the sides which run into the profiled cylindrical outer surfaces of the rod ends.

The sequence of operations is as follows:

Before the holes are drilled in the ends of the rods, the fixture shown in Fig. 1 is used. In the first pass, the broach faces the entire surface including flats for the holes. Then, using a different set of locators, the piece is turned over and the similar face on the opposite side is broached. Approximately  $3/16$ " of metal is removed in each pass, the amount varying due to differences in the sizes of the rough forgings. Because of the heavy pressure exerted on the piece, tending to make it turn or slip in the fixture, double wedge-cam type clamps are used. The clamps are V-shaped with serrated surfaces where contact is made with the large end of the rod. The V's serve to locate the piece in the fixture. The clamp for the small end is flat and also serrated for tight clamping effect. To obtain uniform clamping force even though the size

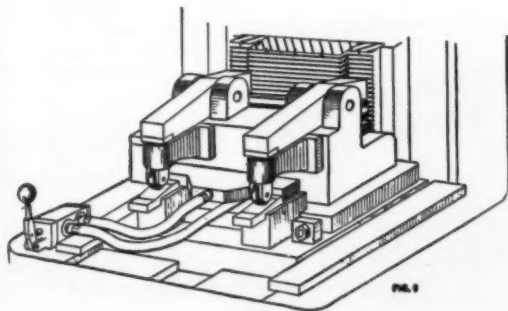
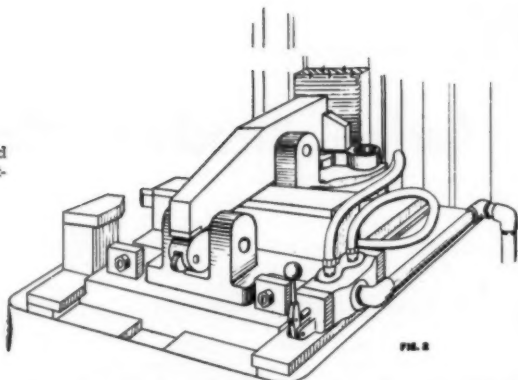


Fig. 1

Fig. 1 — Fixture used in making first broaching pass on both sides of articulated connecting rods.

Fig. 2—Fixture for second pass using holes for locating piece.



of the forging may vary, ample clamping space is provided and the roller-type cam followers are mounted on ball bearings. The wedges also slide on ball bearings. A third factor in holding the piece tightly is that the hydraulic pressure used to operate the clamps is continuously applied while the piece is being broached.

After broaching the faces in the first fixture, the pieces are drilled. The condition of the piece is shown in the upper view in Fig. 3. The pieces are then mounted in the fixture as shown in Fig. 2. In this fixture the holes are used for locating the piece. The broach again removes approximately 3/16" of metal along the faces, but is tapered away from the piece at the ends of the flat surface to allow for a succeeding profiling operation around the rod ends.

The piece is then turned over and using different locators, is broached on the opposite face. The ends are then profiled and appear as shown in the lower view of Fig. 3.

The fixtures are mounted on receding tables of the hydraulic cam lock type for quick loading. Clamping is also hydraulically controlled, the cylinders operating the clamps, especially those used in the first operation, being designed to provide the high clamping force mentioned. In combination with the wedge cams, it is possible to exert enough force to push the serrated clamps of this fixture securely into the surfaces of the piece. And with the continuous application of this force during the broaching operation, no difficulty from slipping in the fixture has been experienced.



Fig. 3—(Upper) Articulated rod after first pass and drilling. (Lower) Rod after second pass and profiling ends.

# "THIS TOOL IS SMARTER THAN I AM"



"MY JOB calls for turning up nuts on a small sub-assembly. We've got to get these things out *fast*, and keep costs down while we do it. So about sunup on Saturday, I've had a heavy week. I'm *tired* . . . couldn't guess within four turns of the right tension. *But I don't have to* . . . this smart gadget does my thinking for me . . . snugs them up just right, disengages, and lets me go right on without missing a beat.

"That's one way we get *production*. That's one reason why we're going to *win this war*."

The "Adjustomatic" Clutch is an exclusive Millers Falls feature on several items in this *quality* line of portable electric tools. Extremely sensitive, it permits even inexperienced operators to work rapidly, *setting up screws and nuts to exactly the pre-selected tension* without delays, without marring the work. Smooth, vibrationless, trouble-free. Torque selection easily adjustable from *outside* . . . just re-set indexed collar. Available now to high-priority producers. MILLERS FALLS COMPANY, Greenfield, Mass.



"Dyne-Mile"

The original pistol-grip electric nut-runner and screw driver. "Adjustomatic" Clutch, light-weight, easy one-hand control, packs plenty of power. Overall length 10". All voltages, speeds, at no extra charge.

## Series 50

Screw drivers for wide range of uses in stands and fixtures. "Adjustomatic" Clutch. Special attention given to easy switch control. Overall length 12 1/2". All voltages, speeds.



**MILLERS FALLS  
TOOLS**

SINCE  
1868

*At Work for Victory*

# Another Tribute To The Super Smooth Finish and Accuracy of **SUNNEN PRECISION HONING**

● To aid them in living up to their slogan of "It Must Be Right," the Hydraulic Press Manufacturing Company has adopted Sunnen Precision Honing.

Replacing hand reaming, the Sunnen method not only saves time, but, in addition, makes possible close tolerances and a super-smooth finish.

## You, Too, Can Profit by These Advantages—

If you are reaming or grinding internal cylindrical surfaces from .185" to 2.400" in diameter, this practical, inexpensive, accurate machine will help you speed up production, cut costs, and improve accuracy.

The Sunnen Precision Honing Machine does not require skilled labor—workers in "teens" can handle jobs in "tenths." Can be set up and work located in less than a minute. Accuracy within .0001" guaranteed. Corrects errors of out-of-roundness or taper caused by previous operations. Relieves big internal grinders for other jobs. Doesn't need fixtures—work is held in hand by operator. Provides simple, low-cost method for duplicating sizes.

Put Sunnen Precision Honing to work in your plant.

**SUNNEN PRODUCTS COMPANY**  
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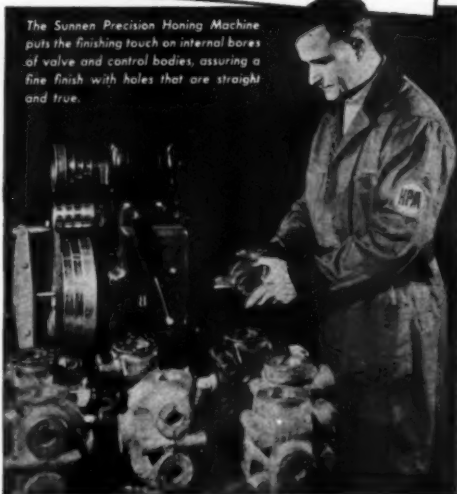
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—giving complete information. Or, if you prefer, a Sunnen Sales Engineer will demonstrate this equipment in your plant on your job.

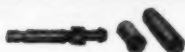
To insure interchangeability of parts, we use Sunnen honing on our HYDRO-POWER Valves and Control Bodies.

— The Hydraulic Press Manufacturing Co.

The Sunnen Precision Honing Machine puts the finishing touch on internal bores of valve and control bodies, assuring a fine finish with holes that are straight and true.



Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surfaces. An extremely smooth surface finish is secured.



Aircraft Engine Parts accurately honed to a super-smooth finish.



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Aircraft Valve Tapped Ball. 4-thrity finish.



Diesel Engine Fuel Injector Cylinder. To accept a pin that is .0005 in. in diameter.



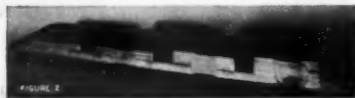
# The "Temp-A-Trol" Welding Process

Unveiled at the recent National Metals Exposition, was a machine claimed to represent an entirely new approach to "resistance welding".

The machine, the "Temp-A-Trol" forge welder, makes possible combined automatic spot welding and heat-treating of alloy steels and heavy sections and permits employment of relatively unskilled labor for spot welding operations, according to the makers, Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.

In general appearance, the welder (Fig. 1) does not differ radically from conventional spot-welding machines. In operation, however, it employs a completely new method of control—the weld itself automatically controlling functioning of the machine.

Previously resistance welding equipment has been operated mainly thru use of pre-selective controls regulating amount of current and duration of that current. Actual settings were determined by trial and error to give the best compromise for the "average" weld in a given material of a given section.



As the makers explain, actually, when operated in this manner, few welds are identical as to quality, because of variations in resistance due to varying metal thickness, varying in-

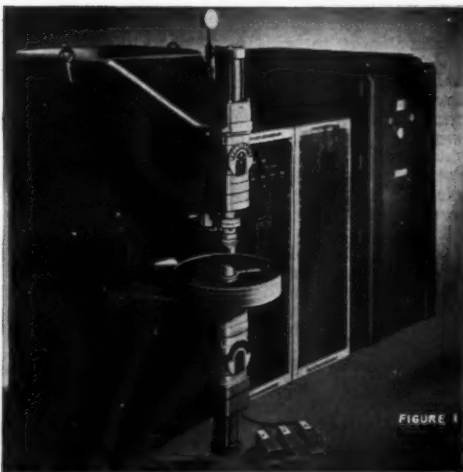
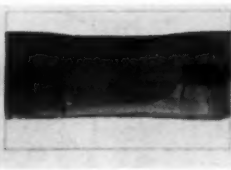


FIGURE 1

duction losses as material enters throat of welder, varying amount of short-circuiting losses thru previously completed welds in the same piece, variations in resistance due to presence or absence of scale, etc., and gradual increase in electrode area due to normally unavoidable mushrooming.

It is for such reasons that many types of resistance welding operations have up to now required close supervision or handling by highly skilled personnel, especially when welding heavy sections and alloy steels.

Flexibility and simplicity in operation are emphasized by the maker's claims that—without changing machine controls—welds of exactly equal quality can be produced consecutively in  $\frac{1}{4}$  to  $\frac{1}{4}$ ", in  $\frac{3}{16}$  to  $\frac{1}{4}$ ", in  $\frac{1}{4}$  to  $\frac{3}{8}$ " or in 3 sections of  $\frac{1}{4}$ " material at the same time. (Fig. 2).



In addition, the welder can be used automatically to heat-treat the weld in the same operation. This post-heat is said to refine the grain size of the weld, increasing its ductility, giving proper grain structure, and "tempering" the weld nugget and adjacent area to any desired amount consistent with characteristics of individual alloys. It is claimed to eliminate the accepted "necessary evil" of coarse and brittle grain structures when welding alloy steels and heavy sections.

To set the controls, it is necessary only to determine the temperatures which will produce the best weld and heat-treat characteristics in any given material.

Controls are then set to values corresponding to these temperatures. It is explained that after the controls are once set, machine will automatically compensate itself and reproduce identical quality welds under wide ranges of variation as to metal thickness, cleanliness of metal and other welding conditions.

Basic element of the control which makes this possible is the incorporation in one of the welding electrodes of a highly sensitive thermo-couple. This thermo-couple automatically shuts off current when correct temperature is

reached, turns it on again when weld has been cooled to the proper degree, turns it off when correct heat-treat temperature has been reached, etc.

Thus, instead of having a definite weld-time and welding-current with variable weld-quality, the "Temp-A-Trol" is designed to reproduce a definite weld-quality with automatically self-adjusting current and time cycles.

To reduce production time and to provide better heating characteristics, current intensity and time are adjustably interlocked—the current intensity automatically increasing in proportion to the weld time required (up to pre-selected maximum).

This new development in resistance welding is said to have been made possible in part by the advent of refrigerated welding. Introduced by Progressive some 11 months ago to facilitate welding of aluminum, etc., the now widely used "Frostroding" enables the maintenance of below-freezing temperatures at the electrodes while the material between them is heated to "melting" temperatures. This permitted incorporation of a thermo-couple in the electrode, while also greatly increasing electrode life.



**The GLENNY**  
**Adjustable-Expansion**  
**BROACH**

Produces low cost, accurate keyways. Eliminates set-up time. Self aligning. Interchangeable parts. Adapted for arbor press, mechanical or hydraulic pressure. Speeds up production. Cutter bars in carbon or high speed steel. Details? Write!

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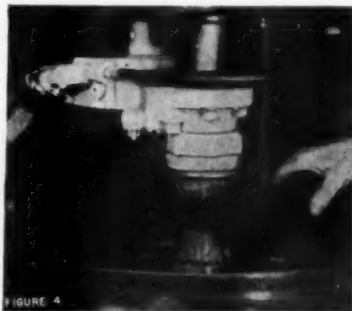
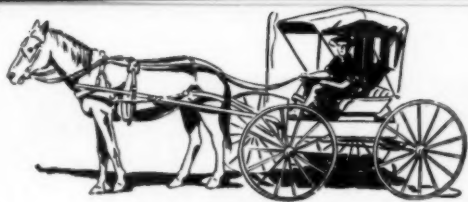
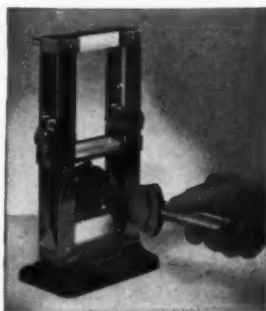


FIGURE 4



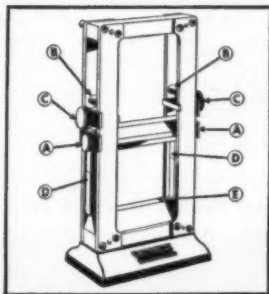
## ARE YOU STILL SETTING YOUR INTERNAL INDICATORS BY THE HORSE & BUGGY METHOD?

### HERE'S THE WAY TO SPEED UP YOUR CHECKING OPERATIONS



• Today, it is just as important to increase your efficiency in setting your internal indicators as it is to increase the efficiency of your production lines. Yes, valuable time is wasted by letting your men use the old fashioned method of setting internal indicators by using clamps and parallels with gage blocks. By using this new Ellstrom Internal Setting Gage, they can set indicators more quickly and accurately so that more of their time can be used on production work.

The diagram at lower left shows the Ellstrom gage set at 3" using Dearborn Gage Blocks and the explanation below gives the adjusting procedure.



Screws A on upper parallel bar have been carefully adjusted and need not be touched. In raising or lowering the bar loosen only screws C, then place fingers on screws A, and move bar upward or downward as the case may be, but without turning the screws.

Allow room to place the gage blocks on lower parallel between the posts of the gage. Then lower bar until its surfaces and those of the blocks fit snugly without any forcing. Tighten screw C lightly and evenly. Screws B are then used to apply slight pressure in making final adjustment.

D gage blocks      E stationary parallel

*For complete description and prices write for our new catalog today.*

**ORIGINATORS OF CHROMIUM PLATED GAGE BLOCKS**  
**DEARBORN GAGE COMPANY 22033 BEECH STREET**  
**DEARBORN, MICHIGAN**

# Spot Air Conditioning

By L. W. CLIFFORD\*

WITH the tightening of critical materials, many new plants are, of necessity, air conditioning only vital areas instead of the entire plant. For example, an airplane plant recently erected a duplicate factory except for the 6000 hp air conditioning plant. Instead, the plant uses several small scattered air conditioning units for essential production spots.

"Spot" air conditioning is increasingly used for such things as special manufacturing processes, laboratories, testing rooms, and store rooms for instruments and perishable supplies. Often individual self-contained units are applied up to 25 tons. For higher capacities a central system may be required.

Spot conditioning of special manufacturing areas is essential to much war production. A typical case is in holding constant temperature and humidity while cutting marine propulsion gears. At one plant, each of the precision hobbing machines is in a separate insulated room. These rooms are air conditioned by 25 units ranging in capacities from  $2\frac{1}{2}$  to 5 tons.

Holding constant temperature throughout the continuous 17-day gear cutting period maintains the required close tolerances. Similarly, low relative humidity prevents condensation on the gears and tools. From 2 to 4 men work in each room and outside air is

introduced, mixed with room air and brought thru the air handling unit to provide a proper working atmosphere. The internal design conditions are 75°F dry bulb, held within plus or minus 1°F, and the relative humidity is held at approximately 60 per cent.

The rooms vary from 12x16' to 38x32x18' high and are of double steel construction with insulation between the walls. Each air conditioning unit has a heating and cooling coil; 13 evaporative condensers are used for condensing purposes.

This is but one of the hundreds of industrial processes where this "spot" air conditioning serves war production. It is flexible, easy to install and adaptable to practically any process where control of temperature and relative humidity is required.

\*Westinghouse Electric & Mfg. Co.,  
East Springfield, Mass.

## Allen Power Bench Type Punch Press



**A Small punch press for small work.**

Height 17½". Base 8½x8½"  
Flywheel 10" D. Wt. 28 lb.  
Stroke ¾"  
Capacity soft iron ¾"Dx½"  
Weight 120 lb.  
Power required ¼ to ½ H. P.

**Price \$125.00**

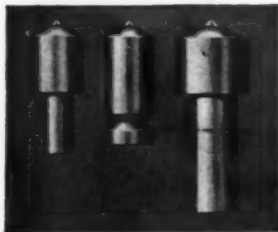
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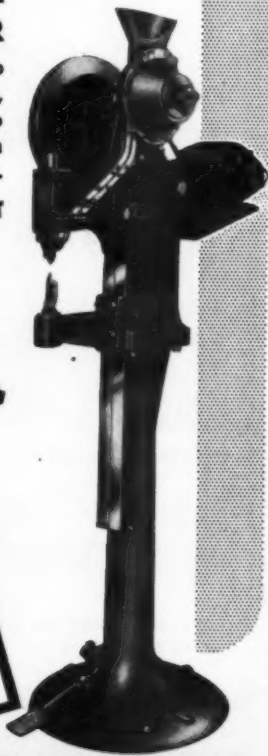
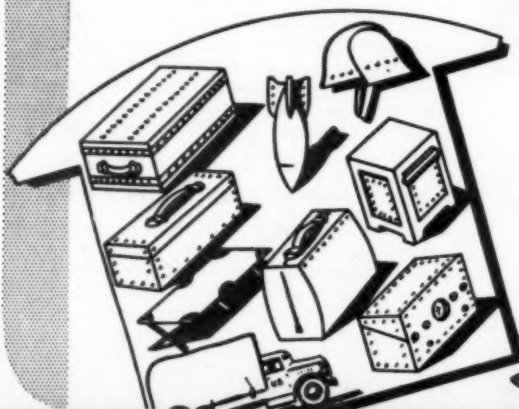
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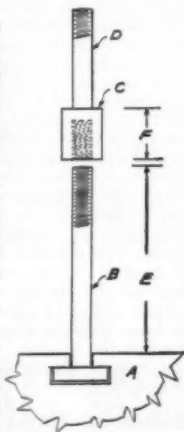
# "Let's Talk Shop!"

## Extending Machine Bolts

By John E. Hyler

**I**N shops where a large variety of work is handled, and where jobs come along that cannot be clamped to machine tables with bolts of ordinary length, it is considerable trouble to carry enough different lengths of bolts on hand to suit all cases. Using the methods suggested here, however, it is possible to clamp work of all heights to machine tables without having a very great assortment of bolts, and also to have the bolts one uses of just the right height so that the ends of them will not be protruding too high above the work.

At A in the drawing is indicated a small broken section of a machine table, showing one of the T-slots, in which the standard bolt B is mounted. A means of elongating this standard bolt, if and as desired, is provided by having on hand a number of extensions such as shown just above it. These are very simply made. Just take a small piece of tool steel, and grind it square, drill and tap as indicated by C, to thread right onto the end of the machine bolt B. The part D is simply another machine bolt with the head cut off of it, and welded to the tapped portion C. When C is screwed onto B, you have a composite



bolt with an effective length much longer. It will be plain, on a moment's thought, that by having a reasonable assortment of lengths of standard bolts B, and also a fair assortment of lengths of extensions CD, that bolts may be assembled to almost any length to fit any condition on short order. The effective thread length inside F should be generous, so as not to put a great deal of strain on just a few threads.

Even in the case of exceedingly high work that might occasionally come along, as many extensions CD may be coupled up onto one standard bolt B as may be desired to make up the required length.

There is another aspect of the same idea which allows for great versatility in the matter of length adjustment on machine bolts. This idea contemplates the threading of machine bolts practically all the way down to their heads, and then fitting them with a very long tapped sleeve instead of the shorter member C. In other words, if the bolt as at B were threaded all thru the span E, and if the member C of the extension, instead of being a length F, were the length of the span E, drilled and tapped all the way, you would have a bolt capable of being adjusted thru a scope or range at least  $2/3$  of E, and still have plenty of threads to hold under the required tension.

An excellent method of storing bolts and extensions of the type shown, adjacent to a machine, is to arrange a small bracketed shelf on a post or on the wall nearby, preferably made of plywood  $1/2$  to  $3/4$ " thick, and to bore it full of a series of holes, so that the bolts may be dropped thru the holes until the head of the bolts or the larger members of the extensions as F comes to rest on the shelf top. This allows one to distinguish lengths at a glance,





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the longer members hanging down the farthest. Incidentally, it encourages keeping the bolts in proper sequence and order, as well.

### Magnesium Welding Method

Much strategic magnesium metal, already fabricated but with small defects, now can quickly and easily be restored to usefulness, by a new fusion method of welding, announced by Dow Chemical Co., Midland, Mich. This definite advance in metallurgy, brought about by close war-time cooperation of 2 major American industries, will contribute much to this nation's production for victory, it is claimed.

This new method takes advantage of peculiar properties of helium, an inert, non-explosive, non-flammable gas, and is the result of joint development by Dow Chemical Co. and Northrop Aircraft, Inc. Of particular interest at this time is the statement that vital aircraft sand castings, some of which were formerly discarded because they did not meet standard specifications, now can often be reclaimed by this advanced method.

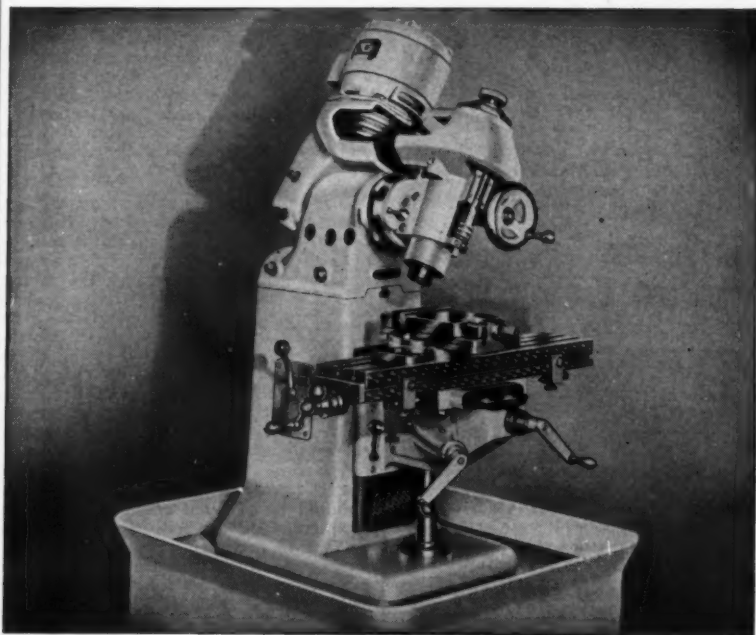
As magnesium, lightest of all structural metals, is an essential material in construction of airplanes and other military equipment, the new helium arc method of welding magnesium alloys has important bearing on war production, according to Dow spokesmen. Its advantages over other methods of joining are elimination of rivets, ease of operation and greater speed of production thruout wider range of design. These results are possible because the electric arc applied to the parent metal is shielded by a blanket of inert helium gas preventing oxidation of the molten weld metal. Oxygen cannot penetrate the helium "envelope."

### Motors on the Job

One of the things that occasionally arise to cause worry for the plant electrician or maintenance man is the electric demand on a given line. It is necessary to know the demand a motor or other electrically-operated device places on a line, before it may be



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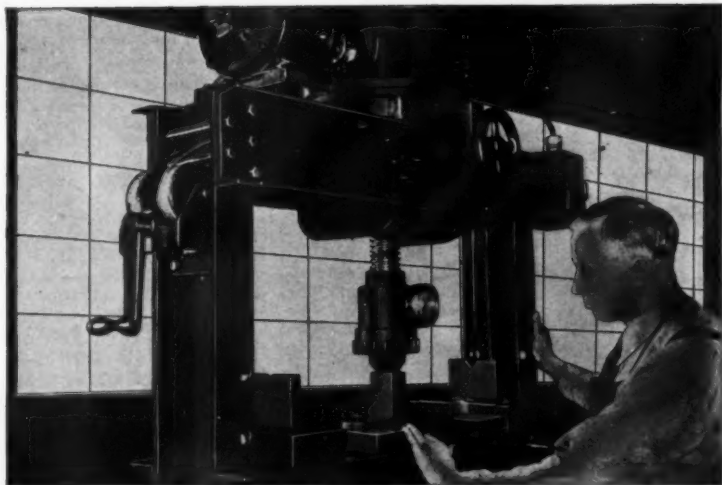
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consistently estimated whether the line is of proper size and correctly installed. As more and more motors are added to a given plant layout, it becomes increasingly important to know whether any of the lines are overloaded. In order to check on this, many are turning to the use of electric demand meters. These devices have long been used by power companies in checking demands on transformers applied to distribution lines, but they are now available for shop application, and are growing in that use. This trend inevitably means that we should have less electrical trouble in the days that lie ahead.

Just as problems that are purely electrical are being solved, we also are seeing very definite progress as touching betterment of the mechanical means for transmitting power from the motor to the machine or other driven device. In the realm of the short-center drive in particular, this can be noted everywhere. Tension-controlled motor bases are a great contribution in this particular direction. Where this principle is employed, the motor is mounted on a pivoted base, and the weight of the motor relative to the pivot point is so adjusted as automatically to maintain just the proper degree of tension in the running belt. Such an arrangement is adaptable for use either as a V-belt or flat-belt drive. Too often, where such a device is not used, the belt is either too loose or too tight. It is a very difficult thing to keep a belt just right as to tension, without some sort of automatic mechanical compensating device, for even varying conditions of humidity will cause the net length of many belts to vary.

Remember that regardless of the efficiency of your motor, if you use too heavy a belt on a short-center drive at speed, or if you use a heavy belt to pass around a pulley of relatively small diameter, you lose much of your motor efficiency so far as the driven machine is concerned. It seems that certain types of belting show up better as to performance on short center drives than do others. A light, flexible belt, that is thoroly pliable, and that



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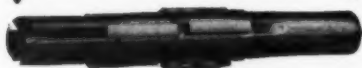
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4A	2" to 3"	34.00
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Adapted for work with both short and long bores.

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0	7/8" to 1"	16.00
1	1" to 1 1/4"	18.00
2	1 1/4" to 1-9/16"	21.00
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will make high frictional contact with the pulley faces, should be selected.

Chain drives may often be used to very decided advantage on short centers. The roller chain has an advantage in such cases, and especially so on drives where there is an advantage in passing the chain first over and then under one or more sprockets, the roller chain is the best answer of all chain drives. It is the only chain that may be operated at fairly high speed, which also possesses the "over-and-under" advantages of a belt drive. Such drive chains and sprockets are obtainable in any power rating desired, and may therefore be applied either to large or small motor drives.

A highly interesting mechanical means of relieving motors of much of the strain of starting under load, is the application of a centrifugal clutch between motor and its driving pulley. The centrifugal clutch operates on the principle of weights being thrown outward more and more as the speed of the motor increases, and the clutch is engaged by these outwardly-moving weights. The load is thus picked up gradually, and any tendency to slow down the motor as the load is engaged, instantly and automatically releases the clutch in proportion. By such a means, it will be seen that the load is automatically assumed just as the motor can consistently take it. Clutches of this type are applied to motors varying from 5 to 100 hp or more, and bid fair to increase in their applications as time goes on.

It is of course important, however, that your motor be not overloaded, no matter how it may be favored in gradual assumption of the load. It is likely that more motor failures could be directly traced to overloading than to any other one cause. There is no good point served in risking costly repairs. A checkup should be made from time to time as to the load your motors actually are carrying. Instruments are readily available for doing this, which are adaptable for both a-c and d-c load testing, and the expense involved in their purchase may be considered as negligible, against the protection

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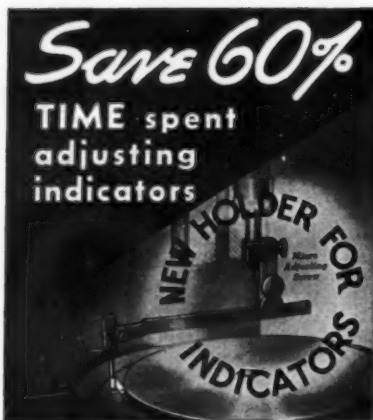
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they furnish for your motors. The day is past when the maintenance man can guess at these matters, and still be considered efficient.

#### EDITORIAL NOTES—

Electric demand meters as mentioned may be obtained from HD Electric Company, 98 West Monroe St., Chicago.

Tension-controlled motor bases are made by The American Pulley Co., 4210 Wissachickon Ave., Philadelphia, Pa., and by others.

One type of belting adapted for short-center drives is that known as "Tentacular," and is sold by Alexander Bros., Inc., 413 N. Third St., Philadelphia, Pa.

Roller chain drives are made by various manufacturers, an outstanding one being the Diamond Chain & Mfg. Co., 465 Kentucky Ave., Indianapolis, Ind. The Cullman Wheel Co., 1350 W. Altgeld St., Chicago also provide chain drives of all kinds.

Centrifugal clutches for motor application may be had from Dickson Automatic Clutch Co., 604 South Hill St., Los Angeles, Cal.

Instruments for testing loads on motors are marketed by Columbia Electric Mfg. Co., 4517 Hamilton Ave., Cleveland, Ohio.

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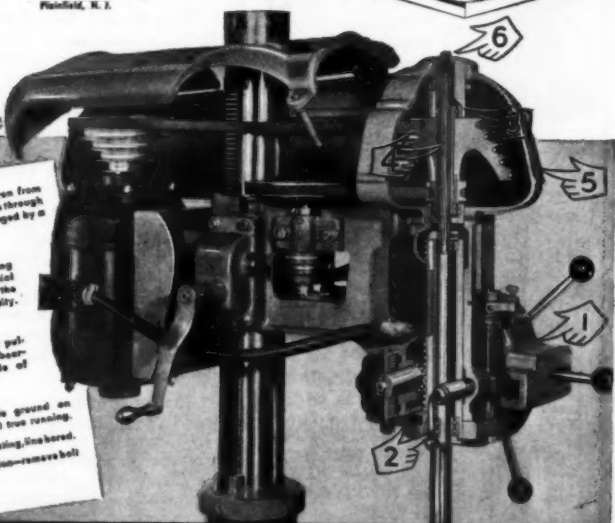
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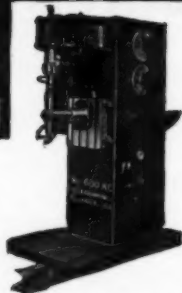
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**How Would You Like** to come down to your shop some morning and find a buck-toothed slant-eyed gent sitting at your desk running your shop and handing you a janitors cap? Then Buy War Bonds!

By Ernest W. Fair

### Drafting Room Hints

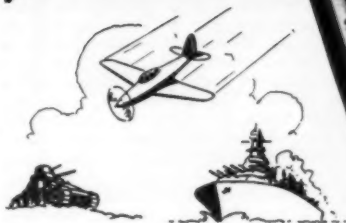
In engineering offices and drawing rooms where Vellum or some other kind of tracing paper is used for lay-outs and detail drawings, it is very aggravating to punch holes thru this paper while drawing lines and circles, dimensioning or lettering notes. This can result from the number of thumb tack holes in the base paper if used too long a time.

Every draftsman and designer tacks a heavy piece of drawing paper on his board to act as a background cushion, or to cover up the many tack holes in his board. As time goes on and he has various sizes of drawings to make, the back ground paper also is well punctured. It is then that the pencil point and also the compass point often slide into a hole in the base paper, making a large hole in the vellum or even ripping it.

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of heavy and expensive drawing paper, this method has been found helpful.

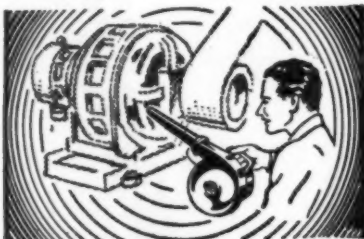
Let us assume that because a 36" wide roll of blueprint paper is used, the vellum drawing paper is cut into blanks of 36x24", 24x18", 18x12" and 12x9". The back ground paper is cut to the size of the board as usual and tacked, clipped or pasted in place. Other additional pieces are then cut 37x25" approximately, for the large size of blank, 25x19", 19x13" and 13x10" respectively for the smaller sizes. If for

instance a 24x18" drawing is made, the extra piece of 25x19" is tacked simultaneously with and beneath the vellum and used only for that size of drawing. The first cost is double but when such pieces last a year or more it can be seen that a considerable saving is effected in place of the large piece that is replaced every 2 or 3 weeks.

It has been suggested that the tracing paper be fastened to the drawing board by small wire staples or clips, but these are inconvenient to use or replace in case the paper expands as it does on damp days. Others have used gummed tape thereby eliminating tack holes. The disadvantage of tape is that there are frequent rips at the corners of the drawing paper caused by careless removal of the tape. Many times this tape leaves some of its gummy substance on the drawing which is hard to remove. If left on, drawings adhere to one another after they are filled in a drawer. Both the paper and cellulose types of tape which transfer their gum to the paper, make possible unsightly smudges, blackened by dust particles on the drawings.

If a drawing board gets so full of tack holes especially in the corners so that tacks do not hold, it is not necessary to plane the board. Plastic wood applied with a putty knife and worked into the holes will produce a smooth surface again. The board should be sanded slightly and shellacked after the plastic wood has been worked in and has hardened.

Because straight edges and celluloid edged scales or drafting machines be-



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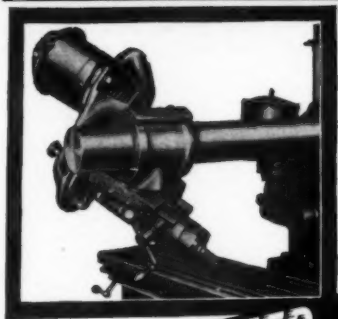
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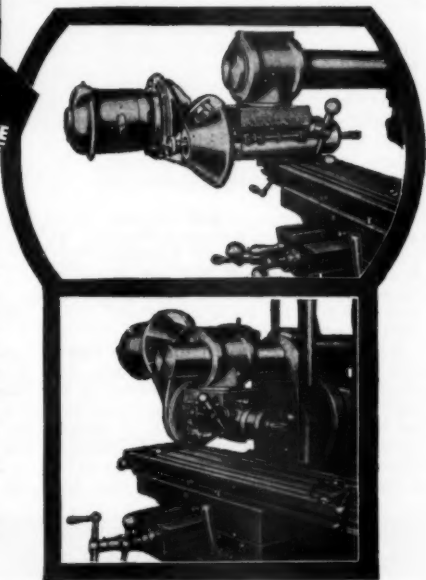
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14230 BIRWOOD AVE.,

DETROIT, MICH.

come nicked easily when bumped into tack heads, thumb tacks of the feather edged variety should be used exclusively. The straight edge or scale slides over them easily without damage to them.

### Carboloy Standard Boring Tools

To expedite delivery and reduce costs of carbide boring tools, Carboloy Co., Inc., has standardized such tools in both solid and tipped styles and is placing the complete standard line in mass production.

The standard boring tools are available in sizes ranging from 3/32 to 1/4" diameters in the solid form, and in diameters ranging from 5/16 to 1/2" for the tipped types.

Both solid and tipped types will be furnished cylindrically ground to a tolerance of plus 0.000 to minus 0.001" with cutting edges unground. This permits user to grind cutting edges to suit specific jobs.

In this manner, it will be possible for users of boring tools to reduce inventory on Carbide boring tools, since it will not be necessary to maintain separate tool reserves for each differently shaped boring tool required.

An idea of the extent to which these new standard boring tools may be adapted for a variety of purposes is shown in the accompanying drawing. At the upper left, (Fig. 1), 2 tipped boring tools are shown, with cutting edges ground by the user in such a manner as to enable their use for

counterboring and chamfering operations. Fig. 2 shows the same tools ground for finish-boring and used in a boring bar drilled at right angles to the boring bar axis.

Fig. 4 shows the same tool, ground for boring bars drilled at an angle to the boring bar axis. To cut grooves

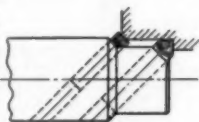


Fig. 1

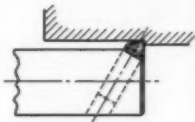


Fig. 4

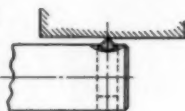


Fig. 2

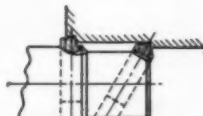


Fig. 5

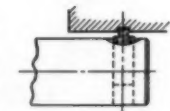


Fig. 3

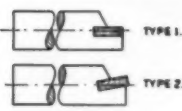


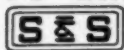
Fig. 6

inside of bored diameters, standard boring tools may be finished to the shape shown in Fig. 3, while rough boring and counterboring with 2 such tools is illustrated in Fig. 5. Tipped boring tools are being made available in 2 styles as illustrated in Fig. 6, the tip in Type 1 being set in line with

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No. 2 in a series showing why "**TOMAHAWK**" tools do a better job of both machining and helping the war effort.

## *Double-end* **TOMAHAWKS** *.....do Double duty.....*

When ordering special forming tools it is frequently a good idea to buy them double-end. You can thus get two tools in one, save precious high speed steel and double the life between grinds.

Just turn the tool around the first time it needs sharpening.

Such tools also reduce grinding time and cost, since it takes less time to grind both ends of the tool at one time than to grind each end separately at different times.

It is not always possible to use double-end forming tools of course. You want to be sure that your tool support will protect the other end of the tool.

But it's worth looking into. There are many such **TOMAHAWK** tools in effective use today.

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on your company letterhead.

**GENESEE TOOL COMPANY**  
**FENTON, MICHIGAN**





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**Transfer Points Eliminate  
Guesswork in Die Making**

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in  $\frac{1}{4}$ " to 1" diameters.

3/16".....\$1.50 per set	5/16".....\$1.25 per set	7/16".....\$1.40 per set
1/4".....1.20 " "	3/8".....1.35 " "	1/2".....1.50 " "

**HEIMANN MFG. CO.,**

**URBANA, OHIO**

axis of tool, while tips in Type 2 are set in at an angle of 10 degrees to the axis.

The line comprises 6 sizes of solid boring bits and 4 sizes of tipped tools, with each of the latter available in the 2 styles described. Tipped tools have a shank length of 2" for the 5/16 and  $\frac{3}{8}$ " diameter sizes, while larger sizes have a shank length of 2 $\frac{1}{2}$ ".

### Accurate Proof-Castings

Cerrosafe is a low temperature melting metal, which may be used accurately to proof-cast cavities such as molds, gun chambers, forging dies, etc. The makers, Cerro De Pasco Copper Co., 40 Wall St., New York, N. Y., emphasize that many materials have been used for the purpose, but were found objectionable because they were either fragile or had excessive shrinkage, or the casting temperature was sufficiently high to cause inaccuracies due to thermal expansion and distortion of parts surrounding the cavity.

Cerrosafe is a mixture of bismuth, lead, tin and cadmium; weighs approximately .35 lbs/cu in; and is completely

molten at 190 F. The pouring temperature should be as low as possible, but sufficient to allow the cavity to be filled before the alloy solidifies. Overheating the alloy prolongs the cooling time and is likely to distort parts surrounding the cavity.

It should be melted in a clean iron ladle. Source of heat should be removed the instant alloy is completely melted. It can then be poured. Casting should be removed from cavity or mold before or when it cools to room temperature. If allowed to remain in mold too long, casting may be gripped in mold. Should this happen, melt the alloy by placing mold in boiling water. In some cases, it is advisable to coat surface of cavity or pattern with lamp black or graphite before casting. Cerrosafe shrinks for a few minutes after it solidifies, due to thermal contraction. The shrinkage is gradually offset during the first 2 hours after casting reaches room temperature by the growth which takes place in the alloy. Because of this property, the casting expands to within a fraction of .001"

 CLOSED TRADE Plain Type	 AUTOM	 CLOSED MARK Offset Type
<h1>CONTINUOUS HINGES</h1>		
<p>             THREE-FOURTHS OFFSET.         </p>	<p> <b>AUTO MOULDING &amp; MFG. CO.</b>   <b>2326 S. CANAL ST CHICAGO</b> </p>	<p>             SEMI-OFFSET         </p>
<p><b>SPECIFICATIONS:</b>            Open Width <math>\frac{3}{4}</math>" to 6"            Gate Material .040 to .125            Pin Diameter .101 to <math>\frac{3}{8}</math>"            Lengths to 120"</p>		

# Try This Easy Way of Cutting off in Lathe!

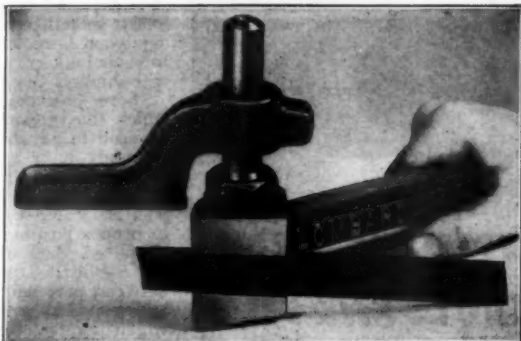
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Problems**

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**Money-back  
Guarantee**

## **The Only Tool Holder With a Steady-Rest!**

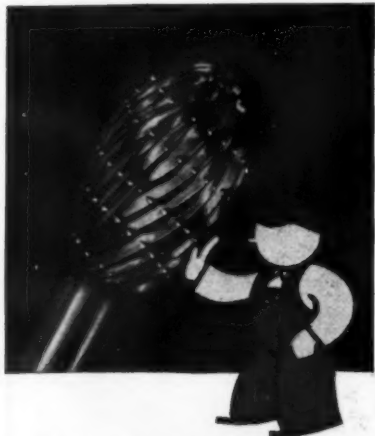
Here's a tool holder that solves, once and for all, the many vexing problems of cutting off in a lathe—because the Lombard Tool Holder makes it absolutely impossible for the stock to jump, or lift, or climb on the tool. Take a look at the picture above and you'll see why!

### ***Holds Work Down!***

Extending at the left is a **STEADY-REST**—a sturdy bar that rides over the work, holding the work down firmly so that it cannot shift its position in relation to the tool. Consequently it is impossible for the tool to chatter or dig into the stock—the common cause of broken tools as well as spoilage of material. It enables the tool to cut smoothly through the stock—just like a butcher knife cutting through cheese. Operates perfectly on powercross-feed.

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**16217 Linwood Ave. Detroit, Mich.**



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ACTION OF ANY ROTARY TOOL**

To get real production on the finishing of metal castings, dies or patterns, you need the kind of rotary tools that take deep sharp bites. Yeomans Tool Regrinding Service puts your worn tools back in top-notch shape — makes them sharp-toothed and hard biting. For prompt service and a good resharpening job on your Burrs, Die-Sinkers, Reamers, Drills, End Mills and Milling Cutters of any size, shape or quantity send them to:

***Yeomans***  
TOOL CO. - 2703 Bay St., Saginaw, Mich.

per inch of a given dimension of cavity into which it is cast.

Small cavities are proof-cast with solid castings of Cerrosafe. Weight of medium and large castings may be lessened materially by using a wood core, on the surface of which small head nails may be driven and left protruding to serve as chaplets for centering core in cavity. Space between inside of cavity and outside of core should be  $\frac{1}{4}$ " or more. Core need not follow exact contour of cavity. Hard dry wood is recommended for the core. Intervening space can then be filled with molten Cerrosafe.

There are other applications for which the properties of Cerrosafe may be used to advantage. One application is to use it as a filler behind delicate parts to be machined or ground in profiling or duplicating machines. The part is located by means of microjacks in proper position on bed plate of machine. A dam of babbiting clay such as "Babbittite" is placed around space between part and bed plate of machine and provided with a pouring gate into which molten Cerrosafe can be cast. Vents should be made at various places in the dam to allow trapped air to escape. The Cerrosafe filler prevents spring and distortion of parts during machining operations. It may be easily remelted and used over again after it has served its purpose. It is also useful for accurate models for engraving machines in cases where pressure of stylus is low.

A new use recently developed for Cerrosafe is for protecting wood core molds and patterns. The coating is applied by means of a low temperature spray gun. Surface of the wood is first given one or two coats of orange shellac (5 lbs shellac cut with one gallon alcohol) and allowed to dry until it becomes tacky. Cerrosafe is then sprayed to the desired thickness. The finished sprayed piece should be set aside for several hours to allow shellac binder to harden. Life of wood core molds and patterns sprayed with Cerrosafe is increased to almost that of solid metal patterns. Changes may be made with very little difficulty.



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**CATSKILL METAL WORKS, INC. — CATSKILL  
NEW YORK**

DIAMETER	AREA SQ. IN.	CIRCUMFERENCE	WEIGHT IN POUNDS PER ONE INCH OF LENGTH					
			CAST IRON	WROUGHT IRON & STEEL	COMMON YELLOW BRASS 60% COPPER	BRONZE	ALUMINUM	LEAD
51	2042.8	160.221	531	574	616	654	189	839
51 1/2	2062.9	161.007	537	580	624	661	191	848
51 3/4	2083.1	162.792	543	587	630	668	193	858
51 3/8	2103.3	162.577	548	593	636	674	195	866
52	2123.7	163.363	554	599	643	682	197	876
52 1/4	2144.2	164.148	559	605	649	688	199	884
52 1/2	2164.8	164.934	564	610	655	694	201	891
52 3/4	2185.4	165.719	569	615	660	700	203	900
53	2208.2	166.504	574	620	666	707	204.5	908
53 1/4	2227.0	167.290	579	625	672	713	206	915
53 1/2	2248.0	168.075	585	632	679	720	208	925
53 3/4	2269.1	168.861	591	638	686	727	210	935
54	2290.2	169.646	596	644	692	733	212	942
54 1/4	2311.5	170.431	602	650	698	740	214	952
54 1/2	2332.8	171.217	607	656	705	747	216	959
54 3/4	2354.3	172.002	612	662	710	753	218	968
55	2375.8	172.788	617	667	716	760	219.5	976
55 1/4	2397.5	173.573	624	675	725	768	222	986
55 1/2	2419.2	174.358	630	681	732	775	224.5	996
55 3/4	2441.1	175.144	635	687	737	782	226	1003
56	2463.0	175.929	641	693	744	788	228	1013
56 1/4	2485.0	176.715	647	698	751	796	230	1022
56 1/2	2507.2	177.500	652	705	756	803	233	1030
56 3/4	2529.4	178.285	658	710	764	810	234	1039
57	2551.8	179.071	664	717	770	817	236	1049
57 1/4	2574.2	179.856	670	724	777	825	238.5	1058
57 1/2	2596.7	180.642	676	730	785	832	241	1068
57 3/4	2619.4	181.427	682	737	792	840	243	1077
58	2642.1	182.212	688	743	798	847	245	1087
58 1/4	2664.9	182.998	694	750	805	854	247	1096
58 1/2	2687.8	183.783	700	757	812	862	249	1105
58 3/4	2710.9	184.569	706	763	820	868	251	1115
59	2734.0	185.354	712	768	825	876	253	1124
59 1/4	2757.2	186.139	717	775	832	883	255	1133
59 1/2	2780.5	186.925	723	782	838	890	257	1143
59 3/4	2803.9	187.710	730	789	847	898	260	1153
60	2827.4	188.496	735	795	853	905	261.5	1161
60 1/4	2851.0	189.281	742	802	862	913	264	1172
60 1/2	2874.8	190.066	748	808	869	920	266.5	1181
60 3/4	2898.6	190.852	753	814	874	922	268	1191
61	2922.5	191.637	760	822	882	935	270.5	1200
61 1/4	2946.5	192.423	766	828	888	943	273	1210
61 1/2	2970.6	193.208	773	836	897	952	275	1220
61 3/4	2994.8	193.993	778	842	903	958	277	1230
62	3019.1	194.779	785	848	912	967	279	1240
62 1/4	3043.5	195.564	790	854	917	973	281.5	1247
62 1/2	3068.0	196.350	798	863	927	983	284	1261
62 3/4	3092.6	197.135	803	868	932	988	286	1268
63	3117.2	197.920	810	875	940	997	288	1280
63 1/4	3142.0	198.706	817	883	948	1005	291	1290



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INFINITE SPINDLE SPEEDS  
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INC.**  
Bridgeport, Conn. U.S.A.

DIAMETER	Area Sq. In.	CIRCUMFERENCE	WEIGHT IN POUNDS PER ONE INCH OF LENGTH					
			CAST IRON	WROUGHT IRON & STEEL	COMMON YELLOW BRASS 60% COPPER	BRONZE	ALUMINUM	LEAD
63 1/2	3166.9	199.491	823	891	955	1013	293	1300
63 3/4	3191.9	200.277	830	898	964	1021	296	1312
64	3217.0	201.062	836	904	970	1028	298	1322
64 1/4	3242.2	201.847	843	913	978	1037	300	1332
64 1/2	3267.5	202.633	850	919	987	1046	303	1344
64 3/4	3292.8	203.418	855	925	993	1052	305	1350
65	3318.3	204.204	863	934	1000	1062	307	1365
65 1/4	3343.9	204.989	868	939	1007	1068	309	1372
65 1/2	3369.6	205.774	877	949	1014	1078	312	1385
65 3/4	3395.3	206.560	883	956	1024	1086	315	1395
66	3421.2	207.345	890	963	1033	1095	317	1407
66 1/4	3447.2	208.131	895	968	1038	1101	319	1415
66 1/2	3473.2	208.916	903	977	1047	1111	322	1426
66 3/4	3499.4	209.701	910	985	1056	1120	324	1438
67	3525.7	210.487	917	992	1064	1128	327	1450
67 1/4	3552.0	211.272	924	1000	1072	1137	329	1460
67 1/2	3578.5	212.058	932	1007	1080	1146	332	1470
67 3/4	3605.0	212.843	937	1012	1087	1153	334	1480
68	3631.7	213.628	944	1020	1095	1162	336	1492
68 1/4	3658.4	214.414	953	1030	1105	1172	339	1505
68 1/2	3685.3	215.199	958	1036	1111	1179	341	1515
68 3/4	3712.2	215.984	963	1042	1118	1185	343	1523
69	3739.3	216.770	972	1050	1127	1196	346	1535
69 1/4	3766.4	217.555	981	1060	1138	1207	349	1550
69 1/2	3793.7	218.341	986	1065	1144	1213	351	1558
69 3/4	3821.0	219.126	993	1073	1152	1222	354	1570
70	3848.5	219.911	1000	1080	1160	1230	356	1580
70 1/4	3876.0	220.697	1007	1088	1169	1240	359	1590
70 1/2	3903.6	221.482	1014	1097	1177	1247	362	1603
70 3/4	3931.4	222.268	1022	1104	1185	1255	364	1615
71	3959.2	223.053	1030	1114	1195	1267	367	1630
71 1/4	3987.1	223.838	1038	1123	1205	1277	369	1640
71 1/2	4015.2	224.624	1044	1130	1213	1285	372	1650
71 3/4	4043.3	225.409	1050	1135	1219	1292	374	1660
72	4071.5	226.195	1058	1144	1228	1302	377	1670
72 1/4	4099.8	226.980	1066	1152	1237	1311	379	1683
72 1/2	4128.2	227.765	1074	1162	1247	1322	382	1697
72 3/4	4156.8	228.551	1080	1168	1254	1329	384	1707
73	4185.4	229.336	1088	1177	1262	1340	387	1720
73 1/4	4214.1	230.122	1094	1184	1270	1346	390	1730
73 1/2	4242.9	230.907	1102	1191	1276	1354	392	1740
73 3/4	4271.8	231.692	1110	1200	1288	1365	395	1755
74	4300.8	232.478	1117	1207	1296	1375	398	1765
74 1/4	4329.9	233.263	1125	1216	1305	1384	401	1778
74 1/2	4359.2	234.049	1132	1224	1313	1392	403	1790
74 3/4	4388.5	234.834	1142	1234	1324	1404	406	1805
75	4417.9	235.619	1150	1243	1334	1415	410	1815
75 1/4	4447.4	236.405	1157	1251	1343	1423	412	1830
75 1/2	4477.0	237.190	1165	1260	1351	1433	415	1840
75 3/4	4506.7	237.976	1172	1267	1360	1440	417	1852

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All sizes up to 4 inches are also  
available with graduations by ten  
thousandths of an inch.

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This instrument is right tested and is guaranteed accurate. If for any reason you are dissatisfied with this tool, return it with this guarantee within 30 days of purchase and a dollar from whom you purchased, and full purchase price will be refunded.

This guarantee, of course, is void in case of breakage, abuse, or other cause not inherent in the tool itself.

**The Central Tool Co.**  
MICROMETERS OF CERTIFIED ACCURACY  
AUBURN, RHODE ISLAND

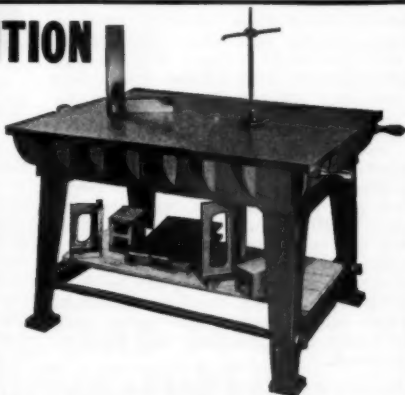
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## A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

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SINCE 1907  
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## Ideas Save Time and Tools

Production on war work has been speeded, tools produce more, material has been saved and rejects reduced as the result of studies of ideas resulting from regular labor-management meetings at the Westinghouse East Springfield works.

One sub-committee reported some very outstanding results by applying hard-chrome plating to the cutting edges of tools and punches. One particular tool in use on all 3 shifts had to be ground once or twice each shift or an average of 4 to 5 grinds per day. In addition to the time lost, much valuable steel was ground away each time, due to deep scores in the grooves. This same tool, after a .0002" chrome film had been properly applied, performed perfectly for seven 3-shift days before regrounding and replating were necessary.

This committee points out that the application of chrome to a tool does not strengthen it, but only supplies a harder cutting edge than can be furnished by the original steel.

It was found that checking and correcting size of drilled holes in castings before tapping eliminated considerable scrap previously caused by oversize and undersize tapped holes, and at the same time reduced tap breakage.

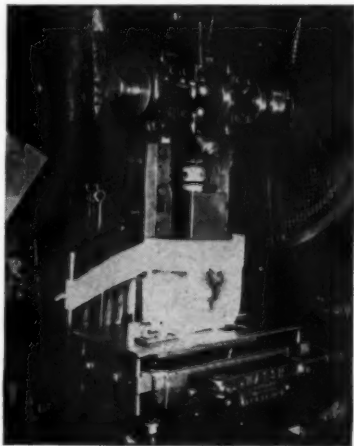
Rust-proofing processes were set-up in cooperation with the engineering department. These processes are now specified on a number of steel parts. Rust can very easily waste time and delay production. Any department with rust problems can profit from a study of these methods.

Convenient shelves were provided on boring and milling machines to hold gauges and fixtures, and saved time previously by trips back and forth to the bench.

Several committees found that by insisting on first-piece inspection and spot checking, they cut down rejects and improved the quality of work. Checking of gauges and measuring tools before proceeding with jobs also helped reduce lost time and materials.

## Protective Guard

A punch press guard with flexible glass panels which give complete protection to the worker and has no moving parts to confuse his vision, has recently been designed by Henry Feldman of the Westinghouse Electric & Mfg. Co., Baltimore, Md.



The guard is mounted on a pin bolted to left side of press frame. It may be lifted or lowered on this pin and held in any desired position by means of a thumb screw. The guard is adjusted so that material fed into die just clears bottom of frame. Ram of the press and movable parts of the die are guarded at front and both sides. There is not enough room between bottom of guard and lower portion of the die to allow the operator's hand to be inserted. This method of protection has been used for some time, and to date its record is said to be perfect.

## Increasing Belt Life

To keep guiding tightener pulleys on the top of sensitive drill presses in line, and thus lengthen belt life, a scheme has been devised whereby adjusting screws replace the flat steel

# TRITON



The fundamental basis of all war production is precision and speed.

Substitute your flush pin gauges, snap height gauges, etc. for special dial indicator gauges. They are:

**MANY TIMES FASTER  
IN OPERATION.  
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We will design special dial indicator gauges to meet your requirements.

Write and tell us your problem—we might have the solution.

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CORD.  
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MANUFACTURERS**

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springs for retaining these pulleys in position.

To use the adjusting screws, it is only necessary to drill and tap a hole thru the spring retainer stud. The belt is run over the pulleys in the conventional manner with the pulleys allowed to take whatever position they will. The set screws are then run down tight and locked in place by means of a lock nut.

The pulleys cannot shift from their position unless the screws are loosened. In this manner, the belt is made to run true and its life is considerably lengthened.

(By Max Kahler,  
Westinghouse Electric & Mfg. Co.,  
East Pittsburgh, Pa.)

## Boring Chuck Retains Cylinder Roundness

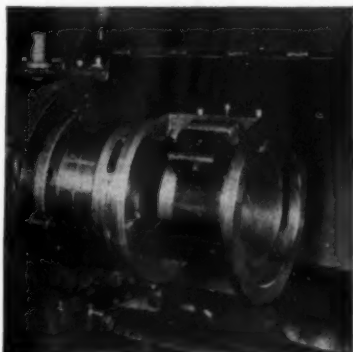
Difficulty is usually experienced in maintaining roundness in the finished bore as a result of holding methods in previous operations.

In a case where it is essential that the bore be round in a metal piece that is out of round on the outside, a chuck has been developed whereby 3 entering and support arms are bored the size of the finished diameter of the cylinder. Two of the supports are fixed, the other has release screws to provide for easy loading and unloading.

In the face of the three supports is fitted a 1/16" thick by 3" wide spring steel band having clamp lugs at each end. The groove for the band is 1/32"

deeper than the thickness which allows the band to lie in the clear for loading and unloading.

The cylinder is placed in the chuck. The band is clamped tightly around. Since the spring steel band is flexible, it conforms to the contour of the cylinder but provides sufficient friction to drive the cut without distortion in the piece. After the clamp band has been tightened, the clamp and cylinder unit is rotated until it stops against one of the supports which serves as a driver. The release screws are then tightened with pressure sufficient to hold the cylinder control but not enough to distort.



Very satisfactory results are obtained from this type of chuck. For example:—A cylinder 6" in diameter by 6" long to be turned outside and bored inside. The usual procedure is to start by using a 3-jaw chuck. In most cases the chuck pressure necessary to drive is sufficient to show a distortion of 5 or 6 thousandths on either bore or turn after removal from the chuck. By the use of conventional methods of machining a cylinder, the distortion carries thru to the finished product.

By C. T. Packer, Westinghouse Electric  
& Mfg. Co., Lima, Ohio.



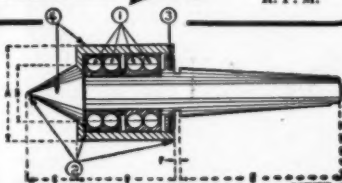
# QUADRO PRECISION LIVE CENTERS

## 5 REASONS Why They Meet Every Specification:

1. **FOUR (4) ROWS** of precision BEC-4 specification bearings.
2. Note **SHORT OVERHANG** assuring rigidity and accuracy... eliminates "chatter".
3. **Positive FELT-SEAL**—excludes dirt—retains lubrication.
4. **HARDENED AND GROUND CONE**—point accurate to within .0002.

5. **HEAVY DUTY**—Note Combined Radial Thrust Load at 100 R. P. M.

Model Type No.	A	B	C	D	E	Combined Radial Thrust Load At 100 R.P.M.	Net Price
2	1 1/2"	1"	1"	1 1/4"	2"	1600	\$23.00
3	1 1/2"	1"	1"	1 1/4"	3"	3300	\$25.00
4	2 1/2"	1 1/2"	1 1/2"	1 1/4"	4"	7500	\$35.00
5	2 1/2"	1 1/2"	1"	2 1/4"	5"	12000	\$47.00



All orders must be accompanied by extendable priority

**FISHER TOOL CO.** 226 LAFAYETTE STREET  
NEW YORK CITY

## TANNEWITZ High Speed METAL CUTTING BAND SAWS

Fastest and best known means of cutting sheet steel, aluminum and magnesium sprues, gates, risers, and kindred items. Provides saw blade travel of over 2 miles per minute with perfect safety. Cuts are exceptionally smooth. Labor savings ranging from 25% to 90% are the usual thing.

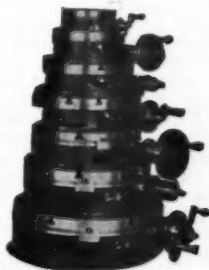
For complete details simply write for bulletin on metal cutting band saws.

Built by Sawing  
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**THE TANNEWITZ WORKS**  
GRAND RAPIDS, MICHIGAN

## TROYKE ROTARY TABLES

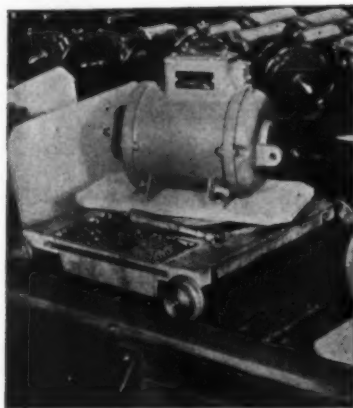


Sizes 9', 12', 15' and 18'.

Ask your dealer or write us for  
eight page catalog.

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4422 Appleton St., Cincinnati, O.

## Turn Table Idea Speeds Assembly



In assembly operations performed on conveyors it is often necessary to turn the apparatus being assembled so that it can be worked on from both sides. A case in point at the Westinghouse Small Motor Division is the assembly of skids or wooden base plates to the feet of small motors.

To expedite the work, a dolly mounted on a turntable rolls along the side rails of a slat conveyor. After the motor has been placed on its base plate on the dolly, 2 nuts on the base plate bolts are tightened. The assembly is then revolved on the turntable, and the 2 nuts on the opposite side are run down and tightened. The assembly is then slid off the dolly onto the conveyor and the dolly is ready for the next motor.

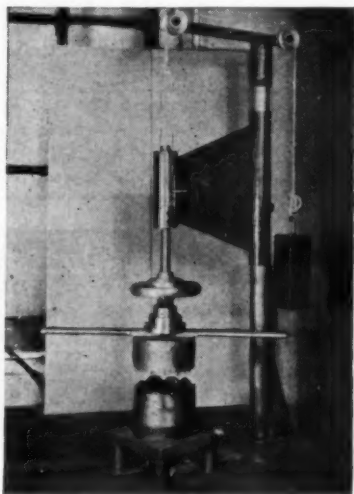
(By C. T. Packer, Manufacturing Engineer, Westinghouse Electric & Mfg. Co., Lima, Ohio.)

## Removing Varnish From Bracket Fit

After parts have been dipped in varnish and baked, it is necessary to remove part of it from the metal. This is sometimes done by sanding or buf-

ing but if the parts are identical and in large numbers, other methods may be quicker and more thoro.

A hollow mill supported from a stand and counter-balanced for ease of operation is used to remove varnish from the bracket fit of small motor frames. The cutter is lowered until a pin in the slide nut engages in the lowest notch in the guide. The cutter is rotated manually and the desired pressure is supplied by turning a hand wheel. When the bracket fit has been properly cleaned, the pressure is released; the slide nut is disengaged from the pin, and cutter is pulled upward by a counter-balancing weight.



A shell cutter is required for each frame size. A side clearance on the teeth is omitted to prevent diameter of the frame fit from being affected. To keep depth of the cleaned surface constant, 4 of the 12 teeth have no back clearance. A spring under the hand-wheel cushions the cutter to permit starting on irregular surfaces, thus compensating for any misalignment.

(By C. T. Packer  
Westinghouse Electric & Mfg. Co.,  
Lima, Ohio)

# SELECTIVE SPEED CONTROL

with

## *Senacon* AIR MOTORS



*Senacon AM-25 Air Motor operating clutch mechanism on Sunnen Hone. Adjustable "beaning" of exhaust port on extension stroke gives any desired rate of closing. Uniform powered operation of clutch reduces operator fatigue and materially increases stone life.*

## DUAL EXHAUST PORTS

The exclusive dual exhaust feature of Senacon Air Motors provides accurate adjustment of the rate of piston rod extension and retraction by simple "beaning" of the proper exhaust port. Independent regulation markedly increases the efficiency of many powered-fixture operations. A typical example is the Senacon-powered clutch of a Sunnen Hone where slow closing is essential to long stone life, and rapid opening speeds production. Senacon-powered

equipment increases production and decreases operator fatigue. Senacon Air Motors with universal integral valves offer the tool engineer countless opportunities for applying controlled auxiliary power to all types of machine tools. Write for new Bulletin B.B. 11 illustrating the wide versatility of these units.

**SMITH-JOHNSON CORP.**

Bendix Building  
Los Angeles • California

**SPEED PRODUCTION WITH AIR POWER**



## Drill Jigs Mounted to Machine Table

By bolting 3 drill jigs to the table of a 4 spindle drilling machine, necessity of the operator centering fixture under the drilling spindle has been eliminated. This permanent mounting, replacing movable fixtures which the operator has to move around on the table, has naturally facilitated production considerably.



The operator lifts the drill jigs by raising hand crank with his left hand and replaces the piece to be drilled with his right hand. When drill spindle has descended a predetermined distance, it lifts automatically. The drilling cycle permits operator to load and unload the 3 drill jigs. He performs the burring operation during the time required for drilling. Spindle at the right is used for removing burrs from around the drilled holes.

(By J. H. Penney, Switchgear Div.,  
Westinghouse Electric & Mfg. Co.,  
East Pittsburgh, Pa.)

## Safeguarding Flying Suits

A periodic cycle of cooling and heating is proving to be the best method

of protecting expensive wool-and-fur flying suits from moths while they are stored between flights. Due to their frequent use, chemical treatment is not satisfactory and may even damage the furs.

The normal storage temperature is 35 to 40 F. In the "shock" cycle, the storage room temperature is reduced to 15 F for several days to kill any larva which may be feeding. Then, by cutting off the refrigeration and introducing heat (usually from strip heaters in the supply duct or coil chamber), the storage room temperature is quickly raised to 50 F where it is held for a few hours only. This causes any surviving larva again to become active and will hatch out any like-wise potentially dangerous eggs.

The temperature, after this few hour period at 50 F is again suddenly dropped to 15 F for a day to kill off the surviving larva and any larva newly hatched. After one day at 15 F the temperature is brought back to the 35 or 40 F storage condition.

This entire procedure is repeated at regular intervals or, to prevent reinfestation, when any appreciable quantity of untreated articles of clothing is placed in the storage room. Relative humidity is high enough to prevent drying and cracking of the fur skin, but low enough to prevent mould or mildew. During the normal storage period with temperatures of 35 to 40 F, the relative humidity is about 50 to 65%.

Typical installations include a flying school using an open-type 7-½ hp condensing unit with 2-speed motor, and a horizontal type air handling unit with refrigeration coil.

At one typical aircraft factory 3—25 hp condensing units and 4 air handling units with refrigeration coils are used.

(By L. W. Clifford,  
Westinghouse Electric & Mfg. Co.,  
East Springfield, Mass.)

---

**"THROW YOUR SCRAP  
INTO THE FIGHT!"**



**early delivery**

**MOREY 8"  
VERTICAL SHAPER**

EQUALLY EFFICIENT IN YOUR TOOL  
ROOM OR MANUFACTURING DEPARTMENT



**features**

**Precision . . . Easily handled—your operators will appreciate it . . . Cutting Stroke changed quickly . . . Feeds varied instantly . . . Power rapid traverse in all directions . . . Brake for ram automatically applied . . . Bijur Lubrication . . . Timken Bearings—Bull gear mounted on Timken Bearings. Roller table mounted on Timken Bearings . . . Modern Design—built to the highest standards of workmanship and materials—simplified operation, powerful yet finger-tip control . . .**

**Also built in 12" and 14" sizes**

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**MOREY MACHINERY CO., INC.**

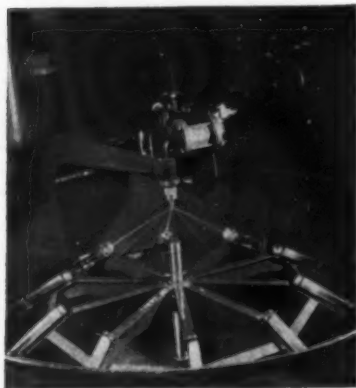
Ask for Circular No. 726

410 BROOME STREET NEW YORK, N.Y.

## Testing Diesel Spray Nozzles

Few people know that a tiny injection spray nozzle, smaller than the tip of the small finger, is literally the heart of a Diesel engine.

One of these nozzles is illustrated undergoing test at the laboratories of The Cooper - Bessemer Corp., Grove City, Pa.



The testing device, developed by research specialists of the company checks the accuracy of these tiny Diesel engine fuel spray nozzles. During the test, each nozzle is fitted into an overhanging arm, fuel oil being forced thru at tremendous pressure into test tubes placed some inches away.

"Each stream of oil," states R. L. Boyer, chief engineer, "must strike the mouth of its particular test tube receiver accurately, and deliver the proper amount of oil in a certain specified time. If the spray nozzle fails to do this, it is rejected, for the test has proved that the bores have not been made with sufficient accuracy."

"The spray nozzle holes", Mr. Boyer said, "must be drilled at precisely the same angle to assure uniform injection of fuel. For if uniformity of injection is not obtained, the Diesel engine cannot operate at its peak efficiency."

These nozzles employ a ring of from 6 to 10 holes. Each hole is drilled individually to a diameter as small as

.008", and operation is similar to that of an atomizer. The smaller the holes, the finer the spray and the more efficiently the oil burns.

The first Diesels used compressed air to blow the fuel oil into the cylinders. Then came the airless injection type of engine, which employed what was called "mechanical injection".

One of the biggest advances Cooper-Bessemer has made in modern Diesel engineering is said to be development of the pressure relief type of fuel injection or "controlled pressure" injection from the older constant pressure system.

## Preserving Metal Surfaces

When it comes to things made of metal, it may well be said that an ounce of conservation is worth a ton of salvage. And among the first laws of such salvage is prevention of rust and corrosion.

Said to be effective for this purpose, a preparation, already in use by many prominent firms, is "395" Metal Preserver, made by Ensign Products Co., 3528 E. 76th St., Cleveland. Full details are to be had from the firm on request. The substance is not a paint; but a penetrant, acting by working into the pores of metals, stopping hidden rust and corrosion, expelling moisture and oxygen, basic agents in formation of rust and corrosion. It is said not to film over rust pockets, but, by adhesion, to bond itself strongly with surfaces, tightly sealing them. It contains no drier, to oxidize, thus never becoming porous or brittle. It remains entirely flexible, say the makers, enabling it to expand and contract with metals under changes in temperature ranging from 0 to 750°, without burning, running or peeling.

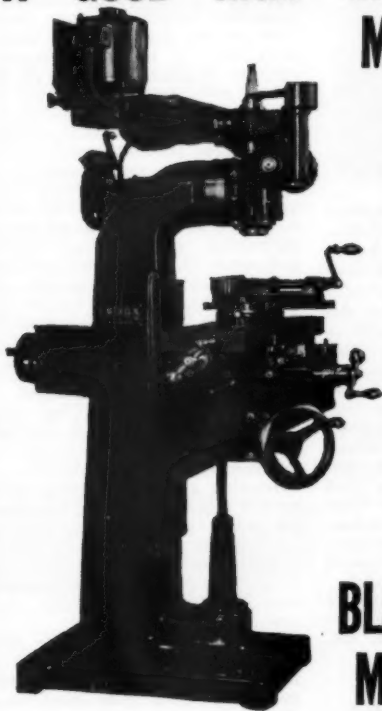
A 1st coat is brushed into the surfaces, and a 2nd flowed on. It dries to touch in 8 hrs. It can also be sprayed on. One gallon covers from 350 to 400 sq ft, says the firm. Among additional features claimed is that the product is a non-conductor of electricity.

The firm also manufactures 348 Rope Preserver and 371, a cleaner-preserver and protector of all types of belts.

# ★★ 40-H INDEX ★★

MANUFACTURED BY INDEX MACHINE & TOOL CO.

## A GOOD HIGH SPEED VERTICAL MILLER PLUS



It has a spindle running in super precision ball bearings and equipped with No. 9 Brown & Sharpe taper.

It will mill with end mills  $\frac{1}{8}$ " to  $\frac{5}{8}$ " in tool steel, will bore a 3" hole in steel with a fly cutter and has verniers for locating. Area capacity 8"x16" at one setting.

Users in hundreds of defense plants say it is the outstanding machine of its class.

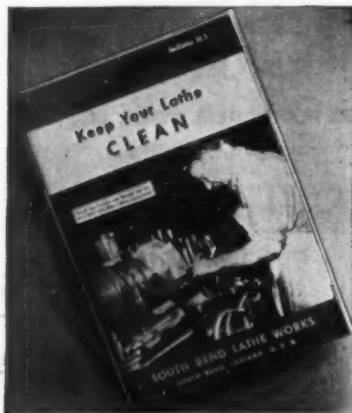
**Sole Distributors**

**BLANK AND BUXTON  
MACHINERY CO.**

**3100 E. Michigan Ave.,  
Jackson, Mich.**



## Getting the Most Out of Your Lathes



Anybody concerned with lathe operation will find much helpful information in this new series of bulletins, issued in the interest of more efficient war production.

"Keep Your Lathe Clean" is the subject of the first bulletin, and is based on the theme of the series, "How to Get the Most Out of Your Lathes." This 16-page bulletin shows how keeping lathes clean will help increase production, reduce scrap, and lengthen the life of the lathe. Its 19 illustrations supplement the clearly written text matter, fully describing the best methods of cleaning the various lathe units. The importance of periodical cleaning of all machine tools is emphasized by the damage that can be caused by accumulated dirt and chips.

Copies of Bulletin H-1, "Keep Your Lathe Clean," are offered gratis by the South Bend Lathe Works, Dept. M6, South Bend, Ind.

### Belt Surfacing Handbook

Anyone responsible for production of metal or plastic parts of small size will find of extreme interest the new 24 page booklet — "Wet-Dry Surfacing",

issued by the Porter-Cable Machine Co., 300-9 Exchange St., Syracuse, N. Y.

This booklet reveals a "new way of doing things to get quick results" and explains factors that make possible this new method. It points out the departments in which belt surfacing saves time, money and manpower in the relief, release and supplement of heavy machine tools; and details, with description and illustrations, many parts on which operations are done freehand or with simple, inexpensive fixtures.

In explaining the utility of wet belt surfacing, this booklet clearly describes such advantages as the elimination of duplicate handling, dust prevention, heat control, discarding of hand filing, production of accurate straight grain uniform surfaces, savings on jig and fixture costs, removal of causes of lock-up distortion, use of semi-skilled hands, material savings, and many other benefits derived thru its use.

In addition to the advantages of wet-dry surfacing in production, the broad uses of this method in toolrooms, metal pattern shops, experimental departments, and machine maintenance and repair shops are also mentioned.

This booklet is thoroughly authentic on this subject as its contents are based on actual jobs now being done in hundreds of plants both large and small.

### Molten Salt Baths

Dupont, Wilmington, Del., has just released a manual under this title, devoted to pertinent information regarding composition and operation of case hardening and heat treating baths. The book is divided into 4 sections, with an index, so users may find desired information quickly.

While the data in the work are necessarily general in character, it is stated, answers to many operating problems will be found.

The book is generously illustrated and contains many valuable graphs, formulas, conversion charts, while the appendix gives data regarding SAE steels.

It is standard size, wire-bound, with index tabs. The firm, says the book will be revised and kept up to date by issuing new sheets as occasion requires.



# PRECISION EQUIPMENT FOR PRECISION WORK



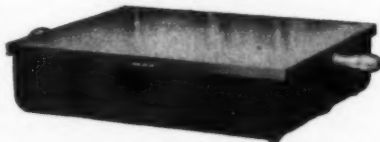
## CHALLENGE SEMI-STEEL LAPPING PLATE

For accurate lapping of joints required to hold oil, this Challenge Lapping Plate is highly recommended. It is specifically designed to assure a perfect fit when lapping metal-to-metal joints on which no sealer of any kind is used. Made of finest semi-steel, specially heat-treated and

machined, this plate has grooves, running the full length and width of the surface. Available with or without an all-steel, arc-welded stand, equipped with lock leveling screws to keep the plate absolutely level. Ask for sizes and prices. There's no obligation.

## CHALLENGE SEMI-STEEL SURFACE PLATE

HAND SCRAPED



Heavy, deep ribs on the under side form triangular supports for the top surface. Felt-lined wooden cover furnished with each plate.

Here is a true surface for tool making, inspection, and testing purposes. Built to retain an accurate plane surface. Made of strong, close-grained semi-steel, specially treated to overcome strains in casting and machining and to avoid distortion after scraping. Nine sizes.

## THE CHALLENGE MACHINERY COMPANY

GRAND HAVEN, MICH.



300

## **"Standardized" Special Tools**

Eliminating much special tool designing on the part of carbide tool users, as well as speeding deliveries of many formerly "special" tools, Carbology Co., Inc., announces a series of extensive "design standards". They are intended to reduce the time interval normally required to prepare design drawings, figure quotations, prepare working drawings, and forming of special samples, etc.

These new standards, while not carried in stock at present, have been evolved as a result of intensive study of special tool orders received in connection with production of war materials.

Studying the records of such orders, it was found that many special tools were, to all practical purposes, quite similar in design and application, differing only in minor dimensions, etc. By eliminating such minor variations—the natural results of individualized tool engineering—the great variety of many special tools and blanks could be reduced, it was found, to a relatively small number of "standard" designs. Prices for such tools have now been established, so they may be ordered without quotations.

It is expected, if demand warrants, that many of the new "design standards" eventually will be added to the great variety of tools already being carried in "stock" for immediate delivery.

Among the varieties of tools and blanks for which design standards have now been established are:—cut-off tools, roller turner tools, grooving tools, shear-type tools; twist drill tips; plug gage and ring gage bushings; drill jig bushings; guide rings; twist drill stock; round, oval and half-round rod, rectangular rod, and tubing.

"Standard Design" cut-off tools range from  $\frac{3}{8}$  x  $1\frac{1}{4}$ " to  $1$  x  $2$ " shank dimensions, the design standards including 5 sizes. Tips on these tools are on right side of shank, viewed from top of tool, front end of left part of shank being chamfered at an angle of  $45^\circ$ . Blank widths range from  $\frac{3}{8}$  on the

smaller, to  $\frac{1}{2}$ " on the larger cut-off tools. The tools have a back taper of  $1\frac{1}{2}$ " on each side to assure free cutting.

Roller turner tools, commonly called "box" tools, have been standardized for use on both Warner & Swasey and Gisholt type lathes. Designed with unusually large tips for maximum life and greatly lower tool cost per piece, these tools are available in 5 "design standards" for W & S and 2 sizes for Gisholt lathes. The former range from  $\frac{3}{8}$  x  $\frac{1}{2}$ " to  $1$  x  $1\frac{1}{4}$ " for shank size and are designed for use in W & S roller turners Nos. M-1370 to M-1375, inclusive. Two styles of such tools are available, one cutting with a  $5^\circ$  lead angle, which is the standard shape. The other is designed for light cuts to a  $90^\circ$  shoulder.

Gisholt roller turner tool types are designed to fit all sizes of Gisholt roller turners—with only 2 actual tool sizes. One of these has a  $1$ " square shank while the other is  $1\frac{1}{4}$ " square.

Three classes of "standard design" grooving tools are now available, these classes differing only as to tolerances on tool width. Class "A" grooving tools are held to a total tolerance of 0.002" while Class "B" and "C" tools are held to tolerances of 0.001 and 0.0004" respectively. The size range—from 0.060 to 0.330 inches—for which grooving tools are available in standardized design and standardized prices, cover approximately 95 per cent of all grooving requirements, it is estimated.

Primarily offered for use on interrupted cuts on large forgings and castings, these tools are characterized by a cutting action which removes cutting contact at a point back of nose where tool is naturally stronger.

The tip is mounted at a  $40^\circ$  negative rake angle in the tool shank, this large angle resulting in a "shearing" or slicing type of cut, reducing impact to the minimum.

The new shear type design standards are available in both left and right hand tool types and with shank dimensions ranging from  $1$ " square to  $1\frac{1}{2}$  by  $2$ ". They are available in both cast iron and steel cutting grades.

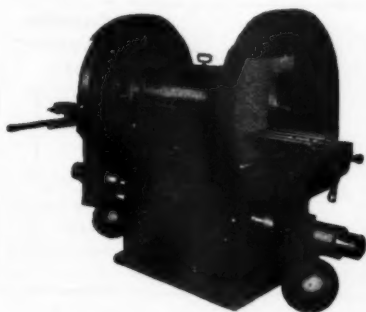
# The RIGHT MACHINE for the Job



Besly can give you the proper machine for your disc grinding operation. From the No. 5-18" light Direct Connected Motor Driven Machine to the powerful No. 214-40" Vee Belt Drive Besly Grinder. Double Spindle Machines for grinding two surfaces simultaneously with grinding members 15" to 72" inclusive—Vertical Spindle Disc Grinders with wheels 18" to 72".



[[ Write for your copy of Booklet  
on Besly Titan Steelbacs ]]

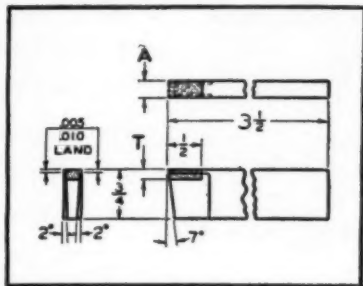
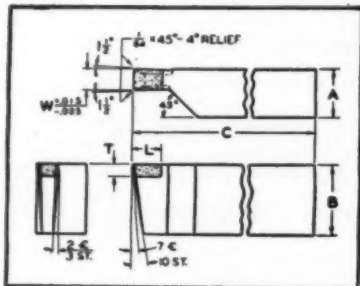


A great variety of feeding arrangements are available and all machines can be furnished for either wet or dry grinding. If you have a flat surfacing problem put it up to Besly.

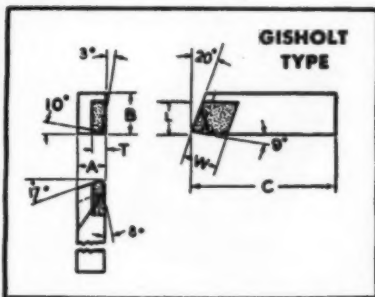
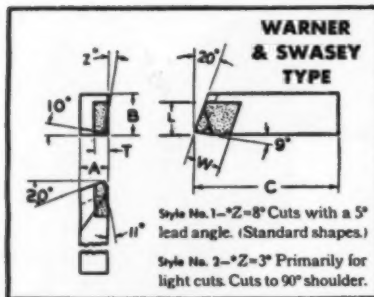
**CHARLES H. BESLY AND COMPANY**  
118-124 NORTH CLINTON STREET ★ CHICAGO, ILLINOIS

quicker delivery, and quantity production in some 30 different sizes, ranging from  $\frac{1}{8}$  to  $1\frac{1}{2}$ " diameter. Sizes adopted by manufacturers are already in use.

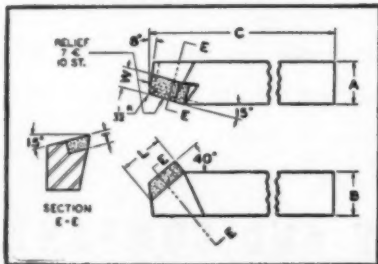
## GROOVING TOOLS



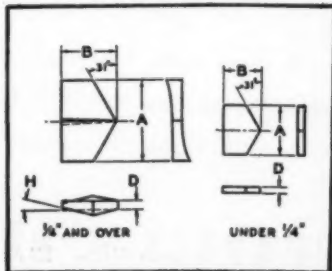
## TOOLS FOR ROLLER TURNERS



## SHEAR TYPE TOOLS



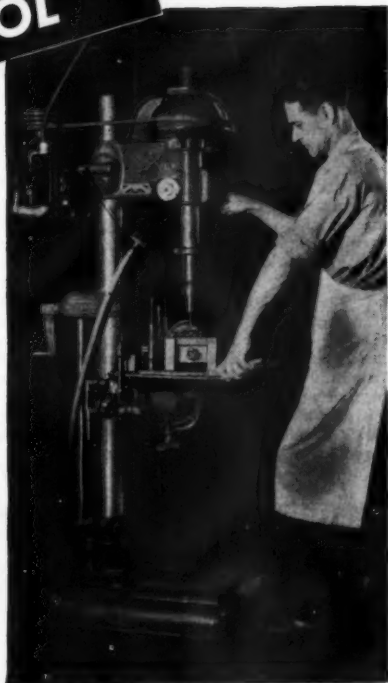
## TWIST DRILL TIPS



*Here's a real*  
**FIGHTING  
TOOL**

***That won't give up...***

It obeys, too, the operator's slightest wish. That's because Buffalo Drills are designed for quick, precision control—easy control which insures more accurate work and speeded-up output. On the production line, in the precision workmanship of the tool rooms, Buffalo Drills are fighting side by side with our determined Industrial Army.



**BUFFALO FORGE COMPANY**

161 Mortimer St.  
BUFFALO, N. Y.

*Canadian Blower & Forge Co., Ltd., Kitchener, Ont.*

***“Buffalo”***

**DRILLING MACHINES**

# "Tooling Up" for



## Foster No. 5 Universal Ram Type Turret Lathe

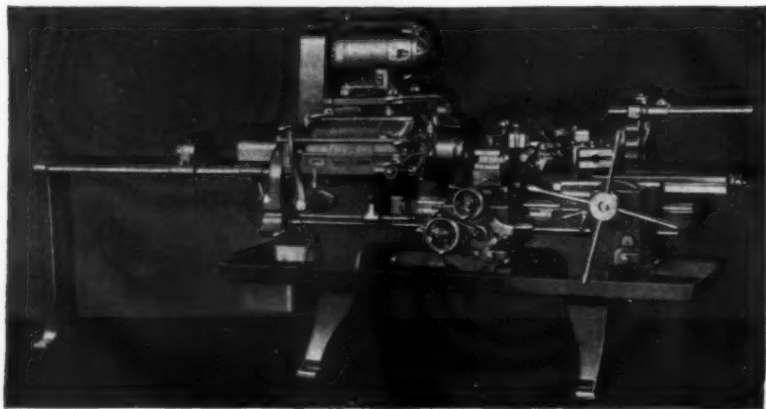
**A**N International Foster No. 5 Universal Ram Type Turret Lathe with collet chuck capacity 2" diameter, and 17½" swing over ways, is announced by International Machine Tool Corp., Foster Div., Elkhart, Ind.

It is supplied complete with tools for both bar and chucking work, and will accommodate 8, 10 and 12" diam chucks. Also, it may be equipped with special attachments conforming to specific applications or specific types of turret lathe work. Included are bar feed and collet chuck, tapering and threading attachment.

Double vee bed ways are of similar construction to those used on Foster Fostermatics. The semi-steel ways are tongued and grooved the full length of bed, and are held by bolts from underside. Should ways become worn or scored in operation, they may be replaced.

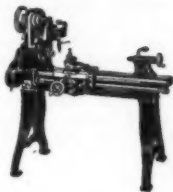
Spindle control is provided by a lever marked "B" on top of headstock, which controls the double multiple disc clutch on main drive shaft. This lever, may be used to shift machine into neutral. In addition, lever marked "R" controls forward and reverse spindle rotation. When placed in central position, machine is also in neutral, and a powerful brake is automatically applied to stop spindle quickly. All-gear headstock provides 8 spindle speeds, controlled by 3 levers mounted on top of headstock. Lever A divides the 8 speeds into 2 groups, 4 high and 4 low speeds. Lever B divides speeds in these groups into 2 groups of 2 speeds each. Lever C selects from this group the speed desired. A safety latch is provided to hold machine in neutral when desired, or when chucking a part.

Individual motor drive is provided for the machine, with power trans-



# SHELDON

Back Geared Screw Cutting  
PRECISION LATHES



## FOR THE TOOL ROOM

The finest 10', 11' and 12' lathes ever built in the moderate price field. Large special analysis steel spindles ground all over, with extra collet capacity. Hand scraped Bronze Ultra-Precision Ball or Super-Precision Roller

Spindle bearings (the finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat ways). These lathes come with a choice of aprons, gear boxes, and drives including the anti-friction base motor drive illustrated. Telescopic Taper Attachment and other accessories available.



## FOR PRODUCTION

Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ball or Super-Precision Roller spindle bearings. Lever-operated Collet Attachment, Lever-operated Tailstock, Lever-operated cross slide with double tool post, Lever-operated turret, etc.



## FOR MACHINE SHOP

Both Bench and Floor models with choice of Semi-quick or Full-Quick Change Gears, Plain Aprons or Worm Feed Apron with Power Cross Feed, Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling Attachments and all standard accessories. Also a full line of Arbor Presses and milling machine Drill Press and Shaper Vises.



## WRITE FOR CATALOG

Just out "The Care and Operation of a Lathe" to help apprentice training. 50c list price, discounts for quantity purchases.

**SHELDON MACHINE CO. INC.**  
4242 N. KNOX AVE., CHICAGO, U.S.A.



**SHOP A** (Penna.) saved one minute each cut on  $2\frac{1}{2}$ " tool steel bars.

Time counts for this company, because in wartime many tool orders are rushed on a production basis.

**SHOP B** (Calif.) reports 62% more cuts.

This small tool company is owned by a prominent consulting engineer who tested hack saw blades thoroughly before switching to Capewell's Technite. You, too, will find they cut faster, last longer. Order from your mill supply man.

# CAPEWELL



mitted by silent-operating multiple "V" belts. Motor is mounted on headstock on a heavy cast iron base providing means for tightening belts. Depending upon the work, various types of motors may be selected. Motors of 3, 5 and  $7\frac{1}{2}$  hp are regularly furnished. For the standard speed range, 3 or 5 hp motors are used, operating at 1200 rpm. For lower spindle speed range, 3 hp motors, operating at 1200 rpm are used. For high spindle speed range, 5 hp motors are used operating at 1800 rpm. When both low and high speed spindle ranges are required,  $7\frac{1}{2}$  hp 2-speed motors are used operating at 1800 rpm and 900 rpm. Motor controls and wiring are built into machine, and a conduit box is provided at rear.

All gears in headstock transmission are heat treated alloy steel, finished by the shaving process. They are of the helical type, providing smooth, uniform flow of power and reducing vibration. Reverse is accomplished thru idler gear. Spindle is mounted on widely spaced, precision type, tapered roller bearings. Provision is made for readjusting spindle bearings to compensate for wear. All other shafts in headstock are mounted on anti-friction ball bearings. Spindle nose is American Standard, size 8", Type A-1. All standard chucks and fixtures mount directly on spindle nose. The large diameter tapered pilot serves only to locate chucks or fixtures without freezing or seizing, while bolts thru body hold them securely to spindle nose. Drive is accomplished by 1" diameter hardened steel drive button.

Universal carriage is provided with 6 reversible cross and longitudinal feeds, operating independently of hexagon turret carriage. Feeds are engaged by individual levers actuating large diameter friction type clutches, adjustable from outside apron. Quick acting levers disengage feed by a slight touch, or may be set for automatically disengaging power feed at predetermined points. Feeding is done by a pinion and rack mounted on bed. Adjustable feed trip dogs are provided for cross slide, and a 6 screw stop roll is provided for longitudinal travel of car-



## EXCELSIOR No. 14 ANGLE ROLLING MACHINE

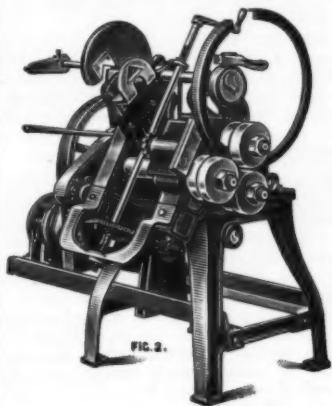


FIG. 2.

Capacity  $2 \times 2 \times \frac{1}{4}$ " Angles. All the rolls are direct driven avoiding slipping of the material between rolls, which are operated by the oversize Excelsior friction clutch. Write for Price and Testimonials.

We specialize in Automatic Grinding and Polishing Machines, to polish Stainless Steel Sheets, Automobile Bumpers, and parts, Stove and Range Top Castings, Electric Iron Sole Plates, etc.

Also Inside Cutting Shears, Deep Throat Power Punches for duplicate work by the use of horse shoe templates up to No. 12 gauge. Used in Stove, Range, Air Conditioning and Kitchen Equipment Plants.

**EXCELSIOR  
TOOL & MACHINE CO.**

East St. Louis, Illinois



**Drop Forged Steel**

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

**E. A. BAUMBACH MFG. CO.**

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## INSPECTOR'S STAMPS



**Faster  
Identification**  
of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

**NEW METHOD STEEL STAMPS, INC.**

145 JOE. CAMPAN

DETROIT, U. S. A.

THE NEW  
**Model H**  
OFF-HAND GRINDER

**FAST—PRACTICAL  
MORE POWERFUL!**

Madison-Kipp tool makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. It's fast (30,000 R.P.M.), more powerful, and has a handier grip. **ORDER TODAY!**

**\$29<sup>75</sup>**

Please Indicate  
Preference Rating  
On Order.

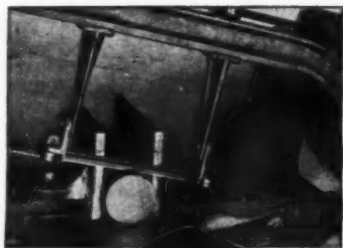
**MADISON-KIPP CORP.**  
207 WAUBESA STREET  
MADISON, WISCONSIN

riage. Hand-feeding to desired dimensions is facilitated by a large micrometer dial graduated in thousandths. Observation clips on the dial make it easy to duplicate close dimensions. All apron gears are of heat treated alloy steel. Apron forms an oil tight case for lubricating oil.

Cross slide holds quick indexing square turret at front. Rear is drilled and tapped for holding rear tool holders and forming tool holders. Quick-indexing, square tool post requires only light pressure on the single lever to unclamp, index and reclamp turret.

Hexagon turret ram slide carriage has 6 power feeds to the ram slide in forward direction. Feeds are engaged by quick-acting lever on turret apron, disengaged by touch. Automatic feed trip and dead stop are provided for each face of hexagon turret by a 6 screw stop roll. Screws are adjustable by a crank and may be set individually for a series of operations. Hexagon turret is automatically unclamped, indexed and reclamped by a 4 spoke pilot wheel which controls forward and reverse movement of ram slide. When ram slide is moved back, turret is automatically unclamped and indexed to next position. On forward motion, turret is automatically located by a hardened and ground taper locating-plug in a hardened and ground steel bushing in hexagon turret. Simultaneously, on forward motion of ram slide, hexagon turret is automatically clamped in place by a double tapered locking ring operated by a powerful toggle lever arrangement. No strain of cut is said to be exerted on the locating pin which serves only accurately to locate hexagon turret.

Lubrication is automatically applied in many places. Headstock serves as a reservoir, and all gears and bearings run in a bath of oil. Main spindle bearings are lubricated from oil drip cups. A sight oil gauge is mounted in front of headstock. Gear train to feed shaft is lubricated by an oil can into spring-cover oil cups for each bearing. Aprons form oil-tight reservoirs holding about 1½ qts of oil. All gears, shafts and bearings are continuously



**Special Container**  
for narrow width  
coils, 100' l.  
Convenient to use.

## ATLANTIC★ Band Saw Blades

*Speed Up*  
**Metal Cutting Production**

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

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**ATLANTIC  
SAW MFG. CO.**

*Metal Cutting Band Saws  
Exclusively*

**153 Brewery St., New Haven, Conn.**



## BUILDERS 'T' SURFACE GRINDER

The ideal, inexpensive, hand-operated grinder for small parts (see photo), tools, dies, and 1001 other small grinding jobs.

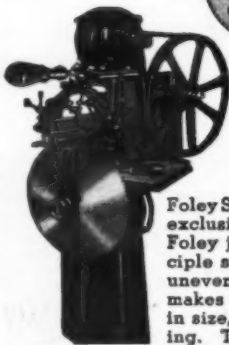
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Bulletin 644.*

**BUILDERS  
IRON FOUNDRY**  
21 Coddington St.,  
Providence, R. I.

## FOLEY FILED SAWS

### Increase Sawing Production

**25%  
TO  
40%**



Your saws will cut faster and truer and stay sharp longer when filed on a

Foley Saw Filer. The exclusive patented Foley jointing principle straightens up uneven teeth and makes them perfect in size, shape, spacing. That is why

Foley-filed saws increase sawing production 25% to 40%. The Foley also cuts down filing time, saves on files and reduces saw breakage. Any man or boy can operate the

## FOLEY AUTO MATIC SAW FILER

The Foley Filer is the only machine that sharpens cross-cut circular saws 3" to 24" in diameter, band saws 1/8" to 4 1/2" wide—all hand saws.

### FILING SAWS FOR VICTORY

The Foley Filer is in use by U. S. Army, Navy, Air Force and many other Gov't Depts.—also by hundreds of Defense projects and industrial plants.

### THOUSANDS IN USE

The Foley Saw Filer has proven its value and quality by many years of use on thousands of machines in service. Write direct to us for literature and prices.

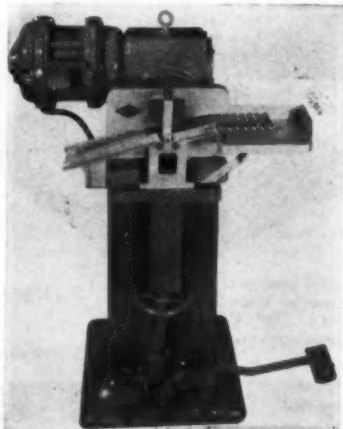
### FOLEY MFG. CO.

26 Main St. N.E. Minneapolis, Minn.  
Also makers of Foley Saw Grinders, Saw  
Setters, etc.



oiled by the cascade method. Coolant sump is welded into coolant gauge pan of the machine and supplies 7 1/2 gpm. It is driven by a belt from the main drive pulley. Coolant is dispensed thru a cock valve.

### Force Knurling Machine



Designed to replace lathe knurling and increase output of cylindrical parts, Wm. A. Force & Co., Inc., 216 Nichols Ave., Brooklyn, N. Y., announces a newly perfected knurling machine. Important among claims for the machine is that it substantially increases output of knurled shells by replacing lathe knurling, thus taking pressure off production line.

Keynoted is the machine's simplicity. The unit is semi-automatic with a production rate of 1000 pieces and over per hour. Work pieces are fed by hand. Action of foot treadle brings work to knurling roll, ejecting it upon retraction.

The machine illustrated is tooled for knurling 20 mm. shells. Similar units may be assembled for knurling other cylindrical pieces, ranging in diameter from 1/4" to 3". It is claimed that knurling formerly done on lathes can be handled by these machines with greater speed and economy.



## INDUSTRIAL DIAMONDS

FOR



## Truing Grinding Wheels



Illustrated is the CRYSTAL type or OCTAHEDRON diamond. By simply resetting the diamond when dull a new hard corner is exposed and its cutting efficiency restored. Both African and Brazilian diamonds shipped promptly from stock in any size or design of steel holder.



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## F. F. GILMORE & CO.

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# *More Speed*

WITH THE  
**NEW**



**CARDINAL  
AUTOMATIC**

***AIR VISE***

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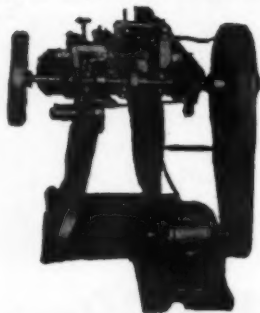
INCORPORATED

GLENDAL, CALIFORNIA

*"The -SPEED-VISE- Manufacturer"*

# DESIGNED FOR HEAVY DUTY

## THE NILSON FOUR SLIDE MACHINE



For Swaging,  
Stamping,  
Piercing,

Blanking, Forming of coiled metal. One of the outstanding features of this combination power press and four slide machine is the powerful and silent action of the main press slide which is operated by crank motion through toggle or knuckle joints. Strength and rigidity achieved by overhead stay rods. Changing dies is a simple and quick operation as the removable die set is easily accessible. The gripping members are independently operated, insuring a positive pull on long or short lengths direct from the reel.

*Write for further information.*

## The A. H. NILSON Machine Co.

BRIDGEPORT, CONN., U.S.A.

### Portable Pump

Latest addition to the line of "Pile Drivers" manufactured by the Lincoln Engineering Co., is the new Lincoln Portable Forced-Induction Pump, "50" Series.

Materials such as sealing compounds, sound deadeners, insulating materials, putty, viscous grease, heavy lubricants, etc., heretofore considered impossible to handle except by time-consuming laborious hand methods, are now pumped directly from original container to point of application. This achievement is said to be possible with a Lincoln "Pile Driver"



which embodies a revolutionary principle of pump design—forced-induction priming.

The new "50" Series Portable Unit is a worthy junior edition of the popular stationary installation type "Pile Drivers" of the "100" and "400" Series. This portable model, however, has the advantage of being designed for use where it is necessary to move the unit from one location to another.

Specifications and complete information can be obtained by writing the manufacturer, Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis, Mo.

### Lapping with a Slotter

Lapping of intricate H.S.S. compression dies, with a Universal Slotmaster, requires a man's time only while setting up the job. . . . In addition to the time saving, this method is said to eliminate all of the inaccuracies (bell-mouth etc.) of hand lapping—a tedious kind of work that is seldom completely satisfactory even when done by an expert mechanic. . . . The lapping

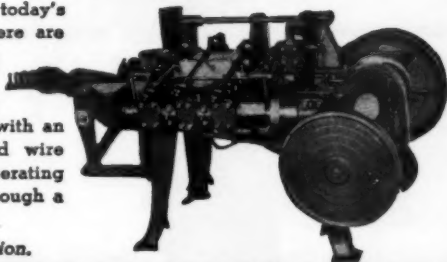
# BUILT FOR SPEED-DURABILITY

## THE NILSON-AUTOMATIC METAL AND WIRE FORMING MACHINE

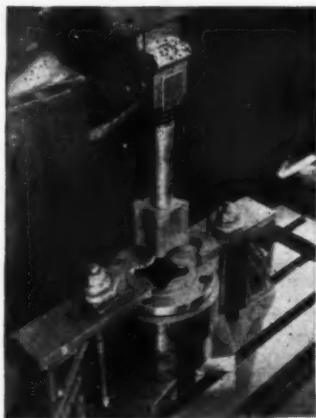
The Nilson Automatic Metal and

Wireforming machine meets today's industrial requirements. Here are some of the features of this machine. Open construction of press and forming tools. Patented slide feed with an independent cam-operated wire gripping device. Power operating wire feed is transmitted through a straight line.

Write today for information.



*The* **A. H. NILSON** *Machine Co.*  
BRIDGEPORT, CONN., U.S.A.



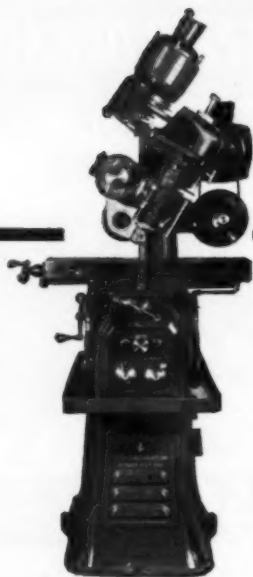
by lowering the lapping arbor to the mouth of the die opening and then setting the down-stroke of the slotter so that it will completely compress the spring, which is mounted between a shoulder on the shank of the lapping arbor and the tool holder. The spring then gradually relaxes and the lapping arbor works its way into the opening, as a result of the spring pressure and the stroking of the slotter. When the spring is completely relaxed—the down-stroke of the slotter is again set up completely to compress the spring and the operation is repeated until the full length of the opening in the die has been lapped.

(Illustration, courtesy Experimental Tool & Die Co., 1260 Greiner, Detroit, Mich.)

### Colloidal Graphite Bulletin

A new 4-page informative bulletin, No. 421-11 on the use of "dag" colloidal graphite as a lubricant for running-in internal combustion engines, compressors and other mechanical equipment has just been published by Acheson Colloids Corp., Port Huron, Mich.

Arbor is mounted in the standard clapper box tool holder of the Slotmaster and is gradually worked into the die opening aided by pressure from a coil spring . . . The operation is started



## NO OTHER MILLER HAS ALL THESE FEATURES

1. Hydraulic Feed. 2. Hand Feed. 3. Vertical and Angle Spindle. 4. Horizontal Spindle. 5. 3 High Spindle Speeds. 6. 3 Low Spindle Speeds. 7. Revolving Turret. 8. 16" Vertical Travel. 9. 16" Longitudinal Travel. 10. 8 1/2" Cross Travel.

Entire tolerances held to less than .001

**ARMOR UNIVERSAL TURRET MILL**

**AIRCRAFT MACHINERY CORPORATION**  
BURBANK, CALIFORNIA

### Attachments

Machine attachments developed for handling out-of-the-ordinary work are legion. Sometimes they are developed and applied by the man in the shop, and at other times by machine builders for their own machines. In the case of a manufacturer of draw-cut shaping machines, the problem of machining male splines on the extended integral hubs of heavy-duty sprockets arose. An attachment for the machine

was developed, which held the sprockets with their extended hubs in axial alignment with the travel of the machine ram and tool. At the same time, the attachment was given a rotary feeding provision, so that circular cuts would be generated by the tool as the work proceeded, if and when other work, purely circular in type, was to be handled. In the case of machining the splines, the machine can be fitted with a double-cutting head mounting two tools which will straddle the spline in work, thereby machining both sides in one operation.

Consider the nut-tapping attachments that some manufacturers of automatic screw machines have applied as a second-operation device. On one

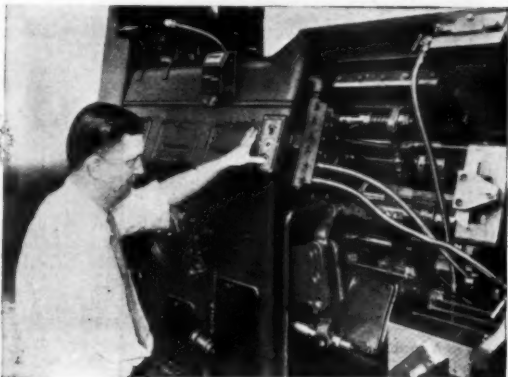
such, an arm takes the nut after it has been cut off at the machine main spindle, carries it to an intermediate position, where a countersinking operation is performed, then transfers it to the tapping unit proper. The nut is then placed in revolving chuck, fed automatically over a bent-shank tap, then goes into a chute, thru which it finds its way into the tote-pan. These two instances, are interesting, yet, merely typical.



## National-Acme Heavy Duty Station Switch

Built with typical machine tool ruggedness, and aimed to end limit switch troubles wherever limit switches are used, is the new, heavy-duty Snap-Lock Control Station Switch, announced by National Acme Co., Cleveland, in a large, descriptive broadside just released.

The new switch was developed, says the firm, at the suggestion of 316 among over 2,000 users of the original Snap-Lock, who, in effect, asked for a control station switch with Snap-Lock features. Claimed for the new product is that it is universal enough to meet voltages and amperages of practically all heavy-duty service needs, whether for initial installation or replacement.



Compactness of design and durability intended for use with machines doing 24-hr war-production duty, are said to be built into the apparatus after tests

### WADE BENCH PROFILER



For rapid production in recessing and slotting operations.

**WADE TOOL CO.**  
WALTHAM, MASS.  
ALSO WADE BENCH LATHES AND  
HAND KNURLING TOOLS

### M-B "UTILITY" Pneumatic GRINDER

STEEL HOUSING—FOR SAFETY



AN important aid to war production. A powerful, high-speed tool, widely used and recommended. A worthy companion to our famous "SUPER SPEED" MODELS S.S.A. Precision made, streamlined, excellent balance. Special grease-sealed bearings—no lubrication required. Also Other Models and Air Line Filters and Automatic Air Line Lubricators.

A FAST-  
CUTTING  
POWERFUL  
TOOL

Write for  
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**UNIVERSAL  
FIRST COMPANY  
IN AMERICA TO WIN COV-  
ETED 20% BOND FLAG**

When each of the 350 of us here at Universal helped give the Allied cause a boost by being America's first industrial plant to subscribe 20% for War Bonds we were mighty proud.

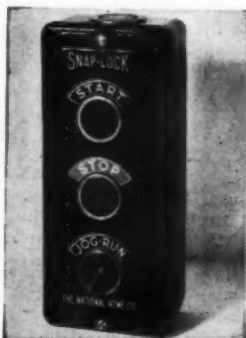
But we're even more proud of the big volume of precision built collet chucks we're turning out daily to help America's arms production.

The Universal collet chuck shown here has ground threads, ample room for tool feed out and is ideal for holding end mills, keyway cutters, drills, etc. Write for facts.



**UNIVERSAL**  
ENGINEERING COMPANY  
FRANKENMUTH, MICH.

on hundreds of National Acme's Acme-Gridley Bar and Chucking Multiple Spindle Automatics, plus rigid tests in other shops.



Entirely separate enclosures are provided for mechanical and electrical sides. Heavy moulded case uses specially selected di-electric plastic material, said to be highly resistant to oils, dust and moisture. Single pole, double-break, double-throw switch is equipped with coin silver contacts, self-wiping on both make or break action. Either circuit is normally open with the other normally closed. Parts are easily interchangeable to multiple assembly for connection with magnetic motor-starters or any normal control circuit.

Standard assemblies consist of 3, 2 or 1-button combinations, either in flush-type for standard cavity mounting, or box-type for surface or pendant mounting. Push or turn-operated buttons, interchangeable for top, center or bottom to suit individual standards, are optional.

The broadside giving full details and specifications is available to interested executives by writing National Acme Co., 170 E. 131st St., Cleveland, O.

**Buy U. S. War Savings Bonds  
and Stamps**

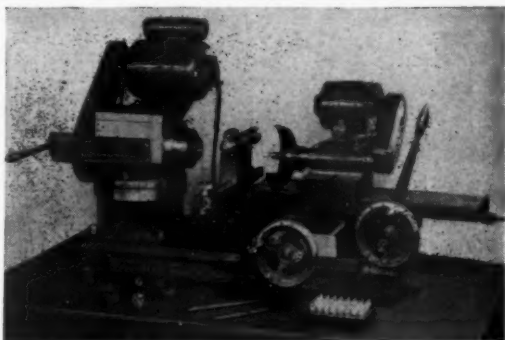
## Abrasive Offers the "IG" Internal Grinder

The Abrasive "I G" Internal Grinder has been developed recently by the Abrasive Machine Tool Co., East Providence, R. I., to handle the large volume of manufacture requiring a highly accurate and easily handled unit. Typical of such work is the large volume of die construction, particularly in bullet and cartridge production.

This machine will grind holes from up to 12" diameter. It has a longitudinal travel of 8" and a spindle cross feed of  $3\frac{1}{2}$ ". Cross feed is provided with hand wheel graduated to .001". Longitudinal feed has a hand wheel also graduated to .001", and a positive stop with micrometer adjustment. These close graduations plus the rapid acting

draw-in collet and the quick-acting hand feed make the unit extremely handy and accurate. It can be used also for external or cylindrical grinding within its capacity.

Work spindle is mounted on pre-



## INCREASE PRODUCTION — SAVE TIME AND TOOLS

use  
**GRAY-MILLS  
METAL-CUTTING**

**"Flo - Bac"**  
**COOLANTS**

Highest  
quality.

4 types cover  
most all require-  
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Immediately  
available.

From your dis-  
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our plant.

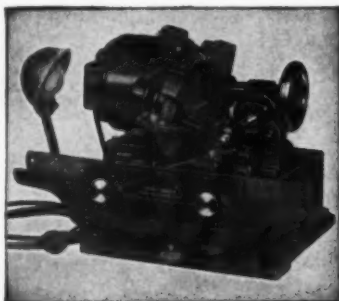
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quantities.

3 gal. to 55 gal.  
— wood or metal  
containers.

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MILLS**

Ask your Distributor or write direct

**COMPLETE PORTABLE COOLANT SYSTEMS  
FLO-BAC COOLANTS, PANS AND FITTINGS  
GRAY-MILLS CO., 215 W. Ontario St., Chicago, Ill.**



Faster saw sharpening at less cost . . .  
**HOWE-LINDSEY**

### **AUTOMATIC SAW SHARPENER**

- HACK SAWS
- BAND SAWS
- MEAT SAWS
- SLITTING SAWS, etc.

Compact, efficient, equally available sharpening hand, power, metal, wood saws and milling cutters to 5/16" face.

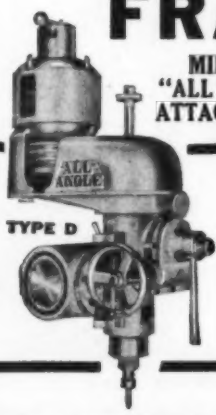
*Write for circular.*

**HOWE & SON, INC.**

HINSDALE, N. H.

# FRAY

## MILLING "ALL ANGLE" ATTACHMENTS



TYPE D

★

*Write for  
Catalog MA*

★

**FRAY MACHINE TOOL CO.**

501 W. Windsor,      Glendale, Calif.

cision ball bearings. It is graduated and swivels to enable grinding tapers up to 90° included angle. Work spindle has 4-speeds, viz., 76, 15, 282 and 540 rpm. Draw-in collet has a quick release attachment. The Dumore 1/2 hp motor driven precision wheel spindle has a range of 6 speeds—4600, 6500, 8600, 14600, 32500 and 42500 rpm to take care of grinding wheels, 1/8 up to 5" diameter. Full load speed of motor is 10,000 rpm.

Actual space required for each machine is 45 x 28". Height from bottom of base to center line of spindle is 12 3/4"—to top of work spindle motor 25". Approximate net weight is 550 lbs.

### **Infra-Red Brochure**

Containing over 100 illustrations and complete description on each, this brochure by Fostoria Pressed Steel Corp., Fostoria, O., is among the most complete and elaborate presentations thus far on the subject.

It suggests to every industrial user for the process where paint baking, drying, dehydrating and preheating are involved.

The opening pages describe "what the process is" and "how it operates"; next follow many installation pictures and case histories. Inside back cover shows user satisfaction thru testimonial letters of several well known manufacturers.

Executives may secure a copy by writing the firm for Flashes No. 942 on company stationery.

**LESLIE HAND PUNCH PRESS**

## MOST CAPACITY POSITIVE ALIGNMENT



Max. cap. 2" dia. hole thru 10 ga. iron, proper shear on punch throat depth 6". Takes punch press dies up to 3"x4" in area.

Leaf arm gives perfect alignment without ways or leader pins. Portable.

*Ask your dealer, or write for circular*

**LESLIE WELDING CO.**

2947 Carroll Ave.      Chicago

## Nutrition

Realizing that all the machines in the world are worthless unless there are strong, capable workers to operate them, the National Association of Manufacturers announced yesterday it will intensify its efforts this Fall to stress industrial health and nutrition programs thru a series of Wartime Clinics on Health in Industry.

First of the series is scheduled for Nov. 4 at Camden, N. J., under joint sponsorship of the Manufacturers' Committee of Camden County Chamber of Commerce and National Association of Manufacturers. Dr. Victor G. Heiser, author of "An American Doctor's Odyssey" and consultant to the N. A. M. Committee on Healthful Working Conditions, and Dr. William M. Gaffner, chief of the statistical unit, U. S. Public Health Service, will be principal speakers.

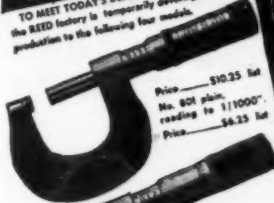
Arrangements now are being made with trade associations in other cities for further wartime clinics this Fall and Winter, similar to those conducted last Spring in New Haven, St. Louis and Kansas City. Sponsorship of the clinics is an activity of the N. A. M. Committee on Healthful Working Con-

## The REED Policy of PLANT EXPANSION

Increased Production  
Simplification of Models

### These 4 Simplified Types

TO MEET TODAY'S DEMAND for micrometers, the REED factory is temporarily devoting its entire production to the following four models.



Price.....\$10.35 list  
No. 801 plain,  
reading to 1/10000\"/>



No. 901 plain with  
vernier reading to  
1/10,000\"/>

### Two Types of Two Inch REED MICROMETERS Now Available



No. 802 plain,  
reading to 1/10000\"/>

No. 802 plain with  
vernier reading to  
1/10,000\"/>

Note: For the time being, No. 801 and No. 901 micrometers are being manufactured.



is aiding us to deliver micrometers to plants that can furnish preference ratings and to mechanics who can fill in our simple form proving that they are working on war production.

### Four reasons for the Increasing Popularity of REED Micrometers.

1. Lead accuracy over the full range of the screw is within a fraction of 1/10000\"/>
2. Longer life of the micrometer screw due to a burnishing process which compresses the surface of the thread making the steel more dense, resulting in greater resistance to wear.
3. Easy reading graduations on thimble and vernier due to freedom from glare and reflection.
4. Fine, sensitive touch because of the smoothness and accuracy of the thread over its full length.

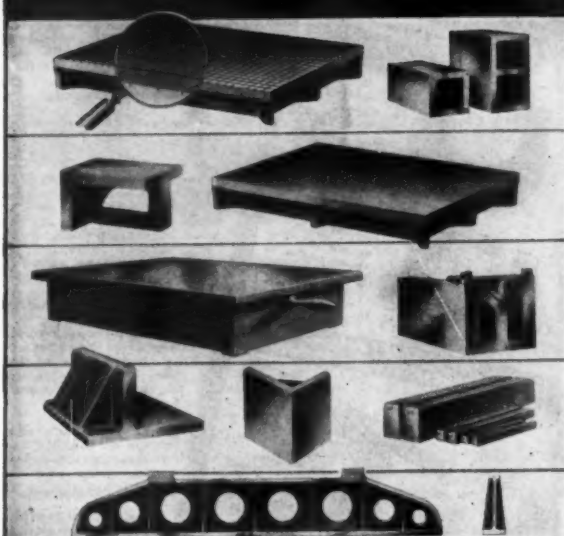
Write today for literature describing the simplified types of REED Micrometers now being produced in ever increasing volume.

**GEORGE SCHERR CO., Inc.,** 111 LAFAYETTE STREET  
NEW YORK, NEW YORK

ditions of which Philip M. Morgan, president, Morgan Construction Co., Worcester, Mass., is chairman

As one of the Fall activities in the field of promoting industrial health, Dr. Heiser, who has won international recognition for his books, most recent of which is "Toughen Up, America," and for outstanding work in Philippines and Orient, also is scheduled to speak at the Round Table on Health In Industry to be sponsored in Boston Oct. 29 by the Associated Industries of Massachusetts.

## Have You a Special Plate Problem?



### LOMBARD GOVERNOR —

for precision production work — is making accurate and specially heat treated Angle Plates, Scraped V Blocks, Lapping Plates, True Surface Plates, Bench Plates, Parallels and Straight Edges. Making these essential inspection parts requires an engineering knowledge which is available to you for your special plate problems.

Send us your drawings and we'll be glad to quote.



LOMBARD GOVERNOR CORPORATION

400 MAIN ST., ASHLAND, MASS., U. S. A.

### Machine Tests Pilots

Not only are planes of tomorrow subjected to exhaustive tests in Army Air Force laboratories. Pilots as well are given various tests to make certain that speed and maneuverability of new planes will not exceed pilots' physical limitations.

It is recognized that limitations of a pilot are most affected by temperatures and altitude, rate of change of altitude, and rate of acceleration. Study

operating conditions now encountered in a plane.

However, normal tests will average from 15 to 20 seconds running time with lower values of acceleration since a pilot would black out before reaching 54 rpm in such a short space of time as 5 seconds. Shortest test run is expected to be approximately seconds and the longest 3 minutes.

Flight surgeons will observe all tests from glass-enclosed control-rooms.

of the first 2 factors is well advanced, and means of protecting against their effects already available. The last factor will soon be investigated by flight surgeons in an eastern laboratory with the help of a "human centrifuge machine". It will reproduce acceleration conditions corresponding to all known or desired air maneuvers.

The machine for which General Electric Co. is now building an electric drive, consists of a horizontal boom with a driving shaft at its center. Cockpits are mounted near each end of the boom, 20' from the center shaft.

The boom will turn as rapidly as 54 rpm, and will reach this speed in only 5 seconds from a standstill. It will decelerate in the same length of time, simulating even more than the severest

## Music

In a talk before the Metropolitan Section of The American Society of Mechanical Engineers recently, Prof. Harold Burris-Meyer, Director of Research in Sound at Stevens Institute of Technology, revealed results of what is claimed to be the first scientific, statistical investigation conducted in this country for evaluating effects of music on employee morale and factory production.

Altho most people agreed that music in industry is a good thing, Prof. Burris-Meyer stated, no one had records to show why it was good, or where, or how. Everybody had an opinion. But material susceptible of statistical analysis was almost totally lacking.

Prof. Burris-Meyer and Richmond L. Cardwell, also of Stevens, therefore invaded a number of factories and war plants in the east to measure the most obvious thing—does music in the factory influence the production rate. Data showed that in 75% of the investigations production was considerably higher where music was used than where not. Increases in production rates, resulting from introduction of music, ranged from 1.3 to 11.1%. Further studies indicated that the effect was not a transient one. Production increases are even more


surprising when it is considered that many of the groups measured consisted of employees on piece work who already were producing at top speed. In addition to increasing the production rate, Monday morning absenteeism and early end-of-day departures were reduced phenomenally.

**Buy United States War Savings  
Bonds and Stamps**

# Douglas

## 32" X 8" PLAIN MILLER

### FOR SMALL PARTS PRODUCTION



WIDE RANGE OF  
SPINDLE SPEEDS  
CENTRALIZED  
CONTROL

**EARLY DELIVERY**  
BY LARGE SCALE PRODUCTION

**DOUGLAS MACHINERY CO. INC.**  
150 BROADWAY NEW YORK, N. Y.





## HART'S MILLING FIXTURES

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes— $\frac{3}{4}$ " to 4".

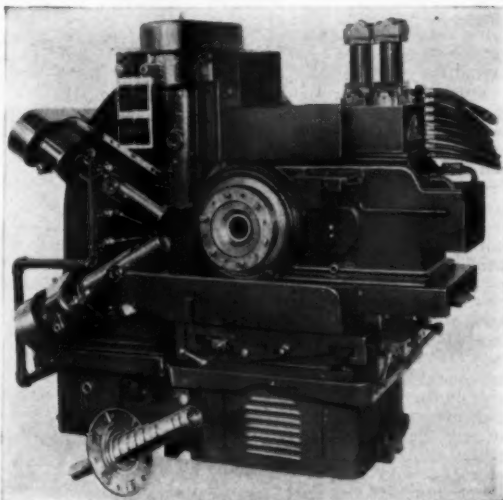
**HART MACHINE CO.**  
26 MATHER ST., DORCHESTER, BOSTON, MASS.

### 3-Spindle Rotary Milling Machine Solves Complex Problem

Typical of the efficiency with which special machines are being engineered to solve complex processing problems in the aircraft industry, is this rotary milling machine designed and built by Snyder Tool & Engineering Company, Detroit. It is used in milling an undercut in the circular shoulder section of a turned propeller-shaft hub, to produce 6 elevated rest pads.

Entire processing operation is fully automatic except for throwing a lever between 1st and 2nd cycles.

With the workpiece loaded and clamped in



## KUTMORE HIGH SPEED ADJUSTABLE HOLLOW MILLS

16 standard sizes—Cutting capacities  $\frac{1}{32}$ " to 2". Also specials made to order.

The KUTMORE is the only hollow mill with built-in micrometer dial adjustment. Prompt delivery—even on specials. Write for Catalog No. 15.

**CARL WIRTH & SON,**

**1625 Clinton Ave., N, Rochester, N. Y.**



Size of Base..... 5x7 inches  
 Size of Jaw..... 3x6 inches  
 Height at highest point..... 2 1/4 inches

## HART'S DIVIDED MACHINE VISES



These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The jaws are tool steel and hardened, the angle holding the work down on the table.

### HART MACHINE CO.

26 Mather St., Dorchester,  
 Boston, Mass.

When writing for descriptive circular kindly mention the BLUE BOOK.

position hydraulically, 1st cycle starts with entire fixture assembly and workpiece moving automatically by hydraulic power along the main slide into milling position.

A transverse sub-slide, also hydraulically operated, then automatically brings workpiece into contact with tools and feeds it forward until required cutting depth is reached. The piece is then automatically rotated thru specified cutting arc. Machine is equipped with 3 milling spindles. Tools have tapered shanks, and, because of small size, are further supported by outboard bearing.

On completion of first 3 cuts, fixture automatically retracts and rotates workpiece 180°, into position for the 2nd 3 cuts which complete roughing operation.

When the 6 rough cuts have been made, fixture again retracts and entire fixture assembly moves along main slide, permitting operator to inspect cutters and finish. Operator then throws small lever which starts ma-

chine thru an identical second cycle in which finish cut is made. Finish cut blends with adjacent surfaces. Indexing is automatic and rotation of fixture during the milling cycle is accomplished thru heavy duty hydraulic cylinders which give adjustable feed rate for milling.

### Norton Tool-Life Books

"How To Increase Tool Life", 24-Pg. handbook, deals with refined surface-finishes, as applied to regrinding of metal cutting tools. Illustrations of cutters under magnification, explain the why and how of cutter maintenance. Another booklet, "Increasing 'Wear Life' by Cylindrical Lapping", treats of this subject in connection with the Norton No. 26 Hypo-Lap lapping machine. It is a reprint of articles on the topic, by H. S. Judge, Norton Co. lapping engineer, appearing in recent issues of Grits & Grinds. The booklets are available on request from the Norton Co., Worcester, Mass.



## The "BABY GIANT" VANDERBEEK Universal Joints

are obtainable in two sizes—the "Baby Giant" for instrument and control work; and the "Giant", with hardened and ground working surfaces for heavy duty work.

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HARTFORD, CONN.





## LONGER LIFE for CENTERS when HARD FACED with

# COLMONOY

Hard Surfacing Alloys and Overlay Metals

COLMONOY faced centers last from 3 to 5 times as long as centers of high speed steel. The unground centers pictured here—unretouched—have been coated with COLMONOY No. 6. Note the uniformity of these oxy-acetylene welding applications. The extremely high wear resistance of the hard surface of COLMONOY overlays will protect all vital wearing parts in the machine tool industry. Mild steel parts coated with COLMONOY alloys wear from 3 to 10 times as long as new parts made of high alloy steel.

### WRITE TODAY

Learn about COLMONOY and what it is doing to conserve vital metals.

### WALL - COLMONOY CORP.

720 Fisher Bldg.,

DETROIT, MICH.

BRANCH OFFICES AT NEW YORK CITY, BLADELL, N. Y., CHICAGO, TULSA, WHITTIER, CALIFORNIA. OTHER BRANCHES IN CANADA.



# COLMONOY

Hard Surfacing Alloys and Overlay Metals

### Electronic Separator

To concentrate metallic ore containing tin and other metals from low grade deposits, an experimental electronic ore separator developed at Westinghouse Research Laboratory extracts ore suitable for smelting. If this separator is as efficient in actual mining operations as in laboratory tests, it will aid in materially easing America's conservation of tin supply.

The separator can sort dry mixtures of any 2 materials provided 1 is a fair insulator and the other has appreciable conductivity. The principle is similar to attraction of iron filings to an ordinary magnet, except that the attraction is electrostatic. Ore ground to the fineness of sand trickles thru a trough and falls onto a rotating metal drum. Here it receives high voltage electrical charges from a series of fine wires.

Most promising results with this development, according to G. W. Penney, manager of the Electro - Physics Division, have been attained with low-grade ore samples from a recently developed tin deposit in a southern state. This sample deposit containing 1 % tin separated by this device, yielded a concentration of metallic ore containing about 70% tin.

The foot-wide metal drum of the laboratory separator turned with a surface speed of 12 miles an hour, sorted in one minute the 10 million particles making ten lbs of ore. Two neat piles of particles were deposited. One contained rock and sand and a small percentage of tin; the other, nearly all tin with a small amount of rock and sand.

## Assembling

There are a great many aspects to assembling, and metal products which call for assembly range from tiny metal wheels for toys up to the most bulky type of structural steel. In the case of very small parts made from sheet metal, it is usually the case that the price they command is so small that some highly productive method of turning them out must be found. Here, the multi-slide type of machine comes in, working the parts progressively with different small dies. Something depends on the design of the parts being cut, formed and assembled, but it is not at all uncommon for one of these machines to turn out 100 or more pieces per minute. They are made by different builders.

It has been pointed out that the resistance welding machine is the most efficient assembling machine that many have ever found. It is a fact that this type of machine has shown the way to profitable production on the assembly line, in the case of many different items to be assembled. Remarkable developments have been made along this line by those who build this type of welder.

When a way can be found to eliminate one or more motions in assembly, a great deal of time is saved. The sub-



*In*  
**PRODUCTION and COMBAT**  
*alike*

**GITS OILERS**

are providing one of the most essential requisites of mechanized warfare, that of positive lubrication under extreme conditions. Every lubricator in this line is designed to a specific need. The Gits Line offers a dependable answer to every lubricating problem, large or small.

Write for  
**CATALOG**  
No. 60

**GITS BROS. MFG. CO.**

1860 South Kilbourn Avenue • Chicago, Illinois

*30 years of oil cup experience*

ject is always worthy of study and examination. In the case of assembling washers of lock type onto bolts or screws, a very remarkable thing was done some years ago by a firm specializing in manufacture of such screw products. Nuts with which the lock washers were to be used, were turned with an integral and undercut flange on their under side, in such manner that the lock washers used had to be forced over them. They would then remain, the nut and lock washer forming a unit, 1-motion assembly.

# Janette

**DEPENDABLE ELECTRICAL MACHINERY**

**MOTOR GENERATORS**

**20 to 6000 Watts—A.C. or D.C.**



## BUILT TO SERVE YOUR NEEDS

The ruggedly constructed Janette motor generators are used the world over because of their remarkable reliability.

Since 1909, Janette has been building electrical equipment with outstanding success. Many vitally important industrial machines that **MUST NOT FAIL**, depend upon Janette apparatus.

We build frequency changers, 25 to 60 cycles, as well as special and standard motor generators in two and four bearing types.

### OTHER PRODUCTS

**ROTARY CONVERTERS • DYNAMOTORS • 1/50 to 7½ H.P. in D.C. and 3 phase A.C. MOTORS •  
MOTORIZED SPEED REDUCERS**

**Janette Manufacturing Company**

**556-558 West Monroe Street Chicago, Ill. U.S.A.**

### Stand-By Power

General Electric automatic stand-by power equipment has been doing sentinel duty for a number of months at a plant of the DeLaval Steam Turbine Company, maker of marine speed-reduction gears. Eliminating time losses due to power failure, and substantially reducing spoilage, the equipment has not only speeded production of these

vital gears but has already justified its installation.

Certain final hobbing operations in manufacture of speed-reduction gears cannot be interrupted or even subjected to appreciable speed variation without affecting accuracy of the work. This is because differences in momentum of the work with relation to that of cutting tool would tend to produce variations in depth of cut.

To guard against power failure or excessive voltage fluctuation, it was decided to install a stand-by power source. Primary requirement was that equipment

have capacity to supply essential loads, ranging from 17 to 23 kw (75 to 100 amperes at 230 volts), for not less than 4 hours.

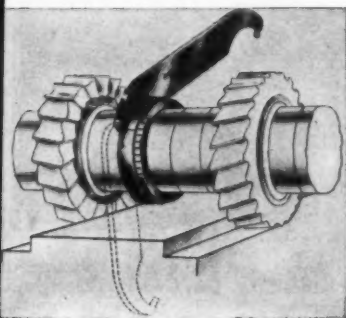
Other requirements were: instantaneous, automatic transfer from stand-by to

normal source and from normal to stand-by source; battery charge rates automatically varying from a trickle rate during stand-by periods up to more than normal rate if necessary following emergency discharge periods; and highest possible dependability.

G-E engineers, working with Edison Storage Battery Co. designed the automatic power-supply stand-by system.

## Spacing Collar Adjusting Wrenches

Spacing Collar Adjusting Wrenches are now furnished as part of the equipment included with the 11 different sizes of micrometer adjustable spacing collars for milling machine cutter arbors being manufactured by the Dayton Rogers Mfg. Co., Minneapolis, Minn.



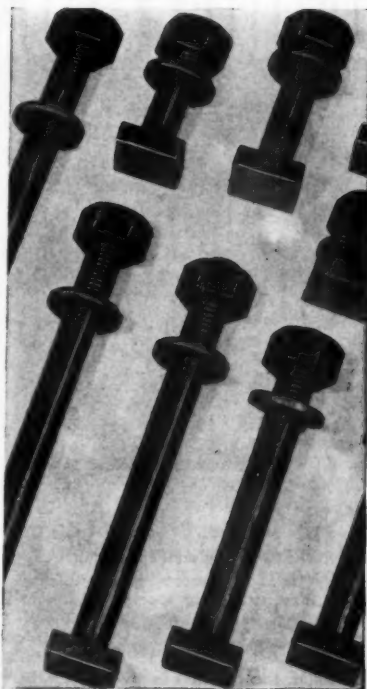
These new double end pin spanner wrenches make it possible for the operator to adjust the spacing collar to the desired adjustment by merely loosening the cutter arbor nut and adjusting the collar to the desired adjustment governed by the graduated micrometer sleeve and turning collar to the desired direction as engraved on the outer sleeve of the micrometer barrel, thus overcoming hand adjustments and making it easier to make the desired adjustments between large diameter gang milling cutters.

### DOUBLE YOUR DRILL PRESS CAPACITY

Minutes are Seconds with the new TWISTITE Vise.  
Opens to full capacity in one second.  
Speed Defense Production with this New Vise.



J. A. Richards Co., Kalamazoo, Mich.



## Boyar-Schultz SMB Bolts

Good machine bolts cost much less than repairs to costly machine tools!!

SMB Bolts are made from special heat treated steel and are machined with head square with body. This permits firm adjustment that holds work through heavy machine cuts. They save the machine, save the job and save time.

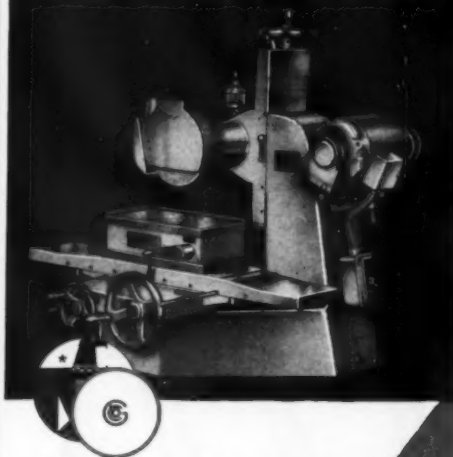
Best results are obtained when SMB Nuts and Washers are used with SMB Bolts. They are heat treated and nut threads are cut square with face.

### BOYAR-SCHULTZ CORPORATION

2108-M Walnut St.,

Chicago, Illinois

# TOMORROW.



**TOMORROW** you must make deliveries. Delivery dates are becoming increasingly hard to meet and every tool in your plant must be kept keen to maintain peak production.

**CARBIDE** tools have been a tremendous factor in the Defense Program, but high efficiency in carbide tools is dependent upon grinding. The GRENBY S-1 Surface Grinder is used extensively for carbide tool grinding. For this work it has no equal.

These features combine to give a perfect grind on carbides:

- ... smooth cable feed, no chatter
- ... spring loaded counterbalanced spindle
- ... precision spindle accurate to .0001
- ... simplified set-up
- ... optional accessories

THE GRENBY line also includes Internal, External, Flute and Cutter Grinders.

Send for the Grenby Catalog



# GRENBY MFG. CO.

## PLAINVILLE, CONNECTICUT

## Measuring Ignition and Corona Voltages



A new electronic crest voltmeter announced by the General Electric Company, Schenectady, N. Y., is designed to measure ignition voltages of internal combustion engines; surge voltages caused by corona and surface discharges in the insulation on such electric equipment as motors, generators and cables; and other repeated impulse voltages up to 30,000 volts.

The instrument, weighing only 15 pounds, fills the need for a portable crest voltmeter for both laboratory and production testing. It is suitable for field measurement, such as trouble shooting and the determination of actual operating conditions, and can also be used for testing aircraft engines in flight.

The crest voltmeter can be used in areas where no electric power is available, since it has a self-contained battery power supply. It can be moved readily to any location for testing purposes—a valuable feature when the equipment to be tested is too large to be moved conveniently.

The voltmeter is equipped with a built-in resistance to provide protection against vibration. It can be supplied marked and calibrated for any of the following scale ranges: 0-10,000 volts; 0-22,000 volts; 0-30,000 volts.

A recent GE publication (GEA-361) gives more detailed information on the instrument.

## Analyzer

A new electric spark photographic device for snapping split-second portraits of liquid spray has recently been disclosed as a possible aid in squeezing more automobile miles out of each gallon of gasoline.

The spray analyzer, developed by Samuel Gilman, 30-year-old research engineer at Westinghouse Laboratories, has been used to photograph water drops one-thirtieth as big as the head of a pin. It may be used by other engineers to study liquid sprays inside carburetors, Diesel engine fuel injector systems, milk evaporators and similar machinery.

New automobile carburetors giving more miles per gallon may result from studies made with this apparatus. By using it, automotive engineers will be able to determine exact size of gasoline drops in the carburetor—the fineness of the droplets influences the rate at which fuel vaporizes. They will also be able to learn if the spray is uniformly distributed thruout the carburetor.

Water drops studied are so tiny that they evade the camera if ordinary exposures are used. The analyzer takes pictures in ten-millionths of a second by means of a high intensity flash from a 5500 volt spark gap. The camera points directly at the flashes and the

spray passes between them. The tiny particles cut off light passing from the electrical spark to the camera and are recorded on the photographic plate as a shadow of white dots. These prints are enlarged 65 times by throwing their images upon a ruled screen where they can be measured easily.

Before clear pictures were obtained the lens action of the particles had to be counteracted. This was accomplished by putting a condensing lens between the spray and the spark gap. It concentrates light on camera lens.



American Thread Dressing Tools are made for all makes of thread grinding machines. Each diamond used is selected for its original characteristics and set to fit the individual demands of the tool.

Every American tool is made with the care and precision required to give maximum performance, then rigidly inspected; modestly priced, and guaranteed to perform satisfactorily.

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## TWO MACHINES IN ONE!

**For Die-Filing Use  
Top Table in Posi-  
tion Shown.**

**For Punch or Blind-  
Hole Filing Tilt Top  
Table Back, Use  
Lower Table.**

**DIE TABLE  
Filing From  
Below**

**PUNCH TABLE  
Filing From  
Above**



No more hand filing of intricate jobs or inaccessible parts! With this universal machine you can take care of all filing and lapping jobs as they come along. Stroke fully adjustable from 0 to  $1\frac{1}{2}$ ". Two Speeds. Fully enclosed motor. Ball Bearings throughout. No dripping of oil. No waste of unused file sections.

*Write for Descriptive Circular.*

**MARBURG BROTHERS, INC.**

Exclusive Distributors

92 West Street

New York, N. Y.

### Axial Movements

Axial movements of shafts and other machine elements might logically be divided into two classes. On the one there are countless axial movements caused by distortion, loads, expansion and contraction, and such are destructive unless means are employed to render them harmless. On the other hand, there are countless axial movements that are an integral part of machine design, as in the case of sliding wheels

and gears, or various axial clutch motions.

Obviously, if a shaft is forced endwise thru the action of contraction, expansion or distortion, and there be no provision in the bearings to provide leeway for the movement, bearings will soon be ruined. This has led some to feel that plain babbitted or bronze bearings are the only answer in shafts liable to such deflections. However, this is not the case. Roller bearings of certain types may be employed with impunity. In one line of roller bearings that has been noticed, the outer race is free from lips or shoulders, and it follows that inner race and rollers and roller cage may move axially as a unit, having a sliding action in outer bearing race, without doing damage.

Of the many different means of moving machine elements axially, which have been employed by machine designers, one of the most powerful and most outstanding has been noted in a certain power control unit, designed for mounting on rear end of a crawler-type tractor. It takes its power from transmission shaft. This power control unit is used in connection with various cable-winding drums, to actuate various motions on earth-moving equipment.



## Design

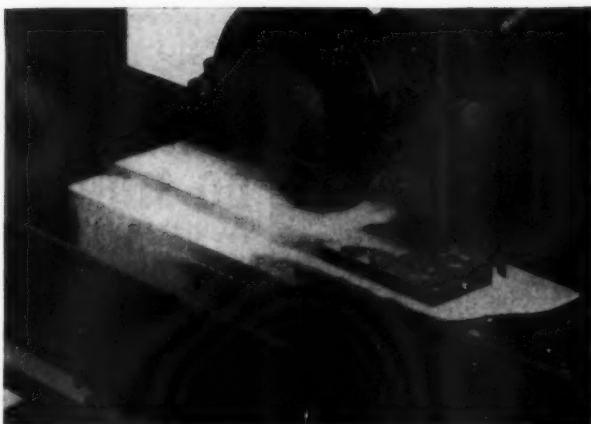
Machines tend continually toward automatic design. As a result, one operator can attend to a more productive machine, or in some cases can tend 2 or more machines, depending on the type of work being handled. Automatic indexing, for repetitive cuts in even spacing, is being used more and more. In a large milling machine of the scissors type, an automatic indexing fixture has been used for milling the clearance and the rake on inserted teeth for circular saws. There are 4 stations on the turret of this fixture, each of which will receive, by clamping, 6 inserted saw teeth. A special multiple-finger ejecting device is operated manually,

or removing teeth milled as they come around to operators station. After ejecting them, the operator clamps other teeth in place. They then proceed on their way to the milling cutters by the automatic indexing motions.

Automatic operation of milling machine tables, in a variety of cycles, is quite easily obtained on some machines, built by specialists in this work. Adjustable dogs are provided in front of the table as a means

of governing its motions. We have come a long way in the matter of automatic milling, from different angles.

Even in the case of automatic screw machines, a type of equipment that is already highly automatic, production has been still further improved by adding automatic rod magazines. These magazines automatically load the automatic screw machine with one rod after another, thereby eliminating loss of time and reducing costs.



## REDUCE SET-UP TIME— GET MORE PRODUCTION

### With BROWN & SHARPE MAGNETIC CHUCKS

PERMANENT MAGNET TYPE

6 Sizes - Rectangular and Rotary Models  
No Wires - No Heating - No Operating Costs



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BROWN & SHARPE MFG. CO., PROVIDENCE, R. I., U. S. A.

# BROWN & SHARPE

# ZAGAR INDEXING AND HOLDING FIXTURES



**Above: Special Adaptation.** Large bore enables 2" Zagar Indexing Fixture to hold heavy part for milling key slots. Screw replaces usual collet. Great accuracy, increased output.

**At right: Zagar Holding Fixture** holds hollow plug rigidly for drilling, cutting screw machine time 30%.

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**really  
DO STUNTS  
... SAVE TIME  
AND MONEY**

*Get new, well illustrated bulletin; shows how to cut screw machine and other costs and jump production.*



**ZAGAR TOOL, INC.**

23880 Lakeland Blvd.

Cleveland, Ohio

## Air Breakers

Power system guardians that use 600-mile-an-hour blasts of compressed air to blow out short circuit arcs will soon be installed to protect electrical equipment at Columbia Steel Co.'s new Geneva Works near Provo, Utah.

Westinghouse is building 22 compressed air circuit breakers, more than 200 motors, and other electrical apparatus for the steel mill, which is being rushed to completion to help meet the nation's war demands for more steel,

contacts. A circuit breaker may have to extinguish an arc several times in a single minute during an electrical storm when thunder bolts are bombarding a power line and then may stand by for months before it is operated.

Included in the equipment which circuit breakers will protect are more than 200 motors ranging from two to 200 horsepower which Westinghouse is building to drive machinery in the slabbing mill.

according to R. A. Neal, manager Westinghouse Switchgear Division.

Each of the breakers will be capable of extinguishing 1,000,000 - kilowatt short circuit arcs in less than a hundredth of a second to prevent damage to the steel mill's power house and transmission equipment. Twenty-three smaller breakers will safeguard motors and other electrical equipment inside the steel plant.

To prevent a power shutdown a small electrical relay that acts as a sentinel instantly detects a short circuit. The sentinel opens a valve which spreads the breaker's contact apart. At the same time a 500-mile an hour gust of compressed air is automatically released from a steel tank to blow out the arc that jumps across the opened

# EVANS High Speed Steel REAMERS



## LOOK AT THESE FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expansion.
- Cannot fall in slots or oil grooves.
- Extension pilots for line-up work.

WILL SHIP ON  
30 DAY'S TRIAL

**EVANS FLEXIBLE REAMER CO.**  
Ravenswood & Wilson Ave.,  
Chicago, Ill.

WRITE FOR  
CIRCULAR

## New Alloy Sprayer



A new, lowcost, self-contained and portable metal atomizer, capable of spraying any neutral alloy which has a melting temperature of up to 600 F for protective coating, reproducing likeness, etc., is offered by Alloy-Sprayer Co., 2040 Book Bldg., Detroit, Mich.

It is recommended for use in making templates, spotting or checking dies, reproducing molds, for making templates, etc. It is especially suitable

where accuracy of reproduction is so fine that even pin scratches must be faithfully reproduced and where the same operation needs a high speed of depositing metal for "backing-up" purposes. The new sprayer, which is described as simple in design and thoroughly foolproof in operation, requires only connecting-in with electric power and factory air pressure line for operation.

No special protection is required for the operator other than adequate ventilation and this is usually arranged so that the sprayed metal can be recovered for re-use. Due to the peculiarity of atomized metal as deposited by this method, the operator doing the spraying can hold light weight work without any danger of burning his bare hands.

The unit shown is a 12-cubic-inch capacity model and is equipped with electrical elements for heating the metal in the heavily insulated pot. Temperature control is variable to suit individual alloys over a range of 100° by

## NO BELT SLIPS WITH VACUUM CUP C. I. PULLEYS



2" to 72" Dia.  
Pat'd U. S.  
Canada  
Great Britain  
30 Day Free  
Trial Offer.

Stock most  
Standard Sizes to 16" Dia.

Shut Off Expense Caused by Slippage  
You Save Money on Every Installation

## NEW LOW PRICED PRODUCTION LINE SOME OF SIZES LISTED BELOW Send for List—On the Shelf

Dia.	Face	Price	Dia.	Face	Price
2"	x2 1/2"	\$1.25	4"	x3 1/2"	\$2.85
2 1/2"	x2 1/2"	1.45	4 1/2"	x5 1/2"	3.95
3"	x3 1/2"	2.25	5"	x4 1/2"	4.25
3 1/2"	x3 1/2"	2.55	6"	x5"	4.75

We supply Fractional Dia. and Face Pulleys—From large casting stock.

**VACUUM CUP METAL PULLEY CO., INC.**  
12535 Grand River Ave.,  
Detroit, Mich.

Increase  
your  
Production

# THREADWELL DOES IT!

## THREADWELL LICKS TOUGH THREADING JOBS MAKING "FULL FORM" BRITISH TAPS

Many American industries are working on orders for Great Britain where British form of thread is required. Here at Threadwell all Whitworth, British Standard Fine and British Association High Speed Taps as small as No. 10 B.A. are ground with a true "Full Form".

For long life and accuracy these taps are unsurpassed. Their manufacture requires the highest standards of workmanship and the most modern equipment. Threadwell has both -- and will continue to turn out these "Taps of Distinction" in an all-out effort for final victory.

THREADWELL TAP & DIE COMPANY  
Greenfield, Massachusetts, U. S. A.

**Threadwell**  
THE NEW NAME FOR  
SUPERLATIVE THREADING

BRITISH TAPS  
BRITISH STANDARD FINE  
WHITWORTH  
BRITISH ASSOCIATION

NOTE THE ONLY  
NOTE THE WAY

**"FULL-FORM"**

SALES AGENTS  
Canada - BRIDGE MACHINERY COMPANY, Montreal  
England - SKYLUX LTD. London

## Put Colwell TOOL POST TURRETS on the job...

Saves Time... Saves Money...

\* SEND FOR FOLDER \*

**S: G: COLWELL**

25 CONGRESS AVE. PROVIDENCE, R.I.

means of a rheostat switch knob on outside of pot. A thermostat holds the metal at any pre-set temperature. Latch cover automatically seals top of pot against air leakage during spraying.

Heating contents of the pot up to the melting point requires approximately 12 minutes after cord has been plugged in. For production spraying, the gun can be kept filled from an auxiliary melting pot.

Actual spraying is accomplished by pressing trigger on handle of gun, allowing the air either to draw, or force, the metal thru nozzle of gun. For work requiring extremely fine detail, the knob immediately above the handle is turned to close a port into the pot and prevent air under pressure from entering top of pot. In this manner, only that amount of metal capable of being drawn off by the ejecting force of the air thru the nozzle and working "against the vacuum in the pot" is sprayed. When port is opened and air permitted to enter top of pot, this additional air pressure combines with the ejecting force and thus increases amount of metal deposited.

No special training is required on the part of the operator. The amount of the coating as it is being applied is easily judged and the spraying operation continued as indicated.

The Alloy-Sprayer is offered complete with gun (containing electrical heating elements, insulated melting pot, control handle and nozzle). In addition, 15 feet of air hose to connect handle of gun with pressure reducer and strainer at the air source and 9 feet of cord with plug-in for the electrical connection are supplied.

## How to Scrap

American Industries Salvage Committee has drawn up a 10-point plan for organizing and conducting a factory scrap campaign. It is said to work best when it is kept simple, without needless officers and steps. Workers should be urged to give their ideas and assistance. The company house organ should campaign vigorously for the drive. Posters about the plant should aid toward keeping up the pressure of enthusiasm. Proper bins and receptacles should be provided for gathering material. Incentive rewards or prizes will bring out employees initiative. Here are the 10 points as summed up in the statement of the plan:

(1) An executive, with authority to act, at the head of things. (2) Posters, prizes, etc. to stir up enthusiasm. (3) Comb plant and yards for dormant scrap, unusable, abandoned equipment. (4) Survey all equipment for possible scrapability. (5) Classify and segregate scrap and supervise its handling. (6) Make foremen responsible for preventing spoilage and waste in their departments. (7) Report at once equipment which is obsolete. If it has not been used in 6 months, and surely will not be used within the next 3, turn it over where it will be used, or scrap it. (8) Salvage

## NO JOB TOO BIG for our research department

The "HARDSTEEL" drill is biting its way through a 17% manganese rail. Work hardening at its worst — all the way. Twelve feet long, weight 650 pounds. 55 1/4" holes drilled — 1-3/4" through — average time: two minutes each. Each hole finished to glass smooth wall. Good production life between grinds.

Every day our research department is drilling customers' samples to prove the claims we make for "HARDSTEEL" drills — their ability



to drill oil-hardened, water-hardened, work hardening, cyanided and nitrided pieces, high carbon — high chrome, and high speed steels of any degree of hardness — without annealing.

"HARDSTEEL" is also available in reamers, tool bits and special tools.



You harden it — we'll drill it  
with "HARDSTEEL"

*Write for literature*

BLACK DRILL CO., 5005 EUCLID AVE., CLEVELAND, OHIO

**REAMERS • TOOL BITS**

usable parts from equipment marked for scrapping. (9) Speed return of scrap to the mills and refineries thru existing channels. Report regularly on collections of scrap to Industrial Salvage Committee, set up by WPB in your community. (10) Enforce monthly rechecks in every department, to find scrap material previously overlooked.

A salvage program in a plant must base on the fact that industrial salvage and conservation form the backbone of WPB's campaign to put the nation's waste back into production.



**The Jackson No. 2 Vertical Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy  $4\frac{1}{4}$ " quill and  $\frac{3}{4}$ " spindle capacity 8' x 32' table.**

## JACKSON

MACHINE & TOOL COMPANY SALES DIVISION  
956 Roberts St. Jackson, Michigan

### Balancing

There are a great many shop men, far advanced in various fields of knowledge, who have failed to get the right idea on dynamic balancing. They have overlooked how very important it is in many cases. A set of balancing ways will indicate the position of static unbalance, or, to put it in other words, the location of unbalance angularly. By removing metal from that portion of the unit which always comes to rest at the bottom, the condition of static balance can be obtained.

This, however, does not locate un-

balance which exists independently in a direction parallel with the axis of the member. Specially designed machines are needed to locate and remove such unbalance, and this must be done before the unit is in dynamic or running balance.

Two factors stand out as being of special importance with reference to dynamic balancing of machine parts. One of these is the speed at which the part is to run. Centrifugal force varies as the square of the speed, and thus dynamic unbalance or its effect multiplies very rapidly as speed is increased. The other important factor is the length of the axis of the parts involved. Since dynamic unbalance is always in a direction that is parallel to the axis, it follows that the longer the axis of a part, the more danger there is that serious dynamic unbalance may be

present. There are firms which make dynamic balancing machines available for fans, crankshafts, cylinders, turbines and many special rotating parts.

For short-axis parts such as flywheels, pulleys, etc., one machine has been noted. It makes use of a universal spirit level to indicate the position of unbalance angularly, and weighing mechanism is incorporated, to show directly the amount of metal which must be removed to effect balance.

## Salvage

The recovery of something like the true worth of metal scrap in large machine shops and metal-working plants where it originates, progressively approaches the scientific basis. Where once scrap was piled loosely into bins and sold to local dealers at a low price, close attention is now given it in many places which have salvage departments. Possibly it was the automobile firms which pioneered in this field of endeavor. The Ford plant at River Rouge installed a huge baling press which takes an old stripped Ford body, and compresses it into a small compact bale suitable for processing thru metal melting furnaces for reuse.

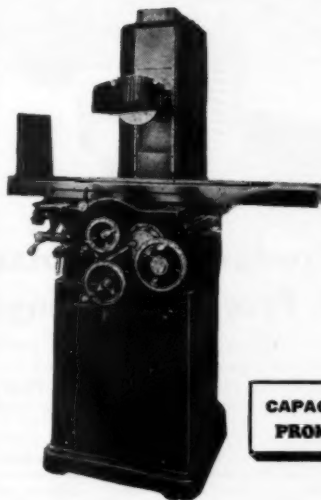
One aspect of salvage noted in the case of metal chips and shavings which accumulate at various machines, and where relatively high-priced materials are machined to some extent, is the use of magnetic separating equipment, which readily separates nickel, brass and other non-magnetic and higher-priced materials from those which are ferrous, thus allowing the higher-priced chips and shavings to be sold or processed separately.

A large de-tinning firm uses powerful baling presses for scrap metal, and

briquetting machines for metal chips and shavings. By having metal in this compact form when it is fed into a blast furnace, a much larger proportion of it will enter the true melt, and much less of it will vaporize. Powerful compression rams operate in the baling presses mentioned, to force the scrap metals into baled form, after the hopper of the press has been properly loaded. Baling makes for greatest efficiency in handling the scrap.

# ATLANTIC

## No. 2 Automatic Precision SURFACE GRINDER

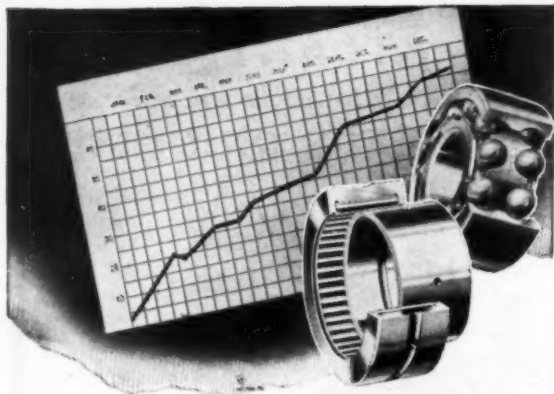


ANTI-FRICTION  
POPE—S.K.F.  
SELF-CONTAINED  
SPINDLE

CAPACITY 6' x 12' x 18'  
PROMPT DELIVERIES

**ATLANTIC MACHINERY CORP.**  
149 BROADWAY, NEW YORK, N. Y.





## Increasing Production Quotas with MCGILL Precision Bearings

American industrial production is at the highest peak of its history — and yet, quotas are being increased . . . the superior performance of McGill Precision Bearings parallels the amazing record of American war production machinery.

The gruelling twenty-four-hours-a-day seven days a week schedule, so necessary in maintaining our war supply lines, is made possible only with superior equipment. . . McGill Precision Bearings are helping meet the challenge for increasing war production quotas.

BEARING DIVISION — 1700 No. Lafayette St.



### Electrolytic Tinning

Desperate necessity of conserving dwindling stocks of tin due to the shut-off of 80% of world tin supply from the far east has resulted in great dependence being placed on the comparatively new electrolytic tinning industry. Expansion of the industry is being rushed to take care of much of the United Nation's tinning needs.

So Said J. H. Hopper, G-E industrial engineer, before the annual con-

vention of the Ass'n of Iron & Steel Engineers, Pittsburgh September 22.

Use of electrolytic tinning, contrasted with the old method of hot dipping saves 60% of the tin, it was pointed out. It makes possible a thinner and more even application of tin to base metal.

"Most of the hot dipped tinplate—considered by some more suitable for certain requirements—is being used by the armed forces. This means that electrolytic tinplate lines now being set up must produce a large part of the plate needed for tin cans for civilian requirements. Estimates of 1943 requirements call for 1,400,000 tons of tinplate to be electrolytically coated," Hopper said.

"The vision and courage of some men in the steel industry and others indirectly connected with it, who pioneered development of electrolytic tin-

plate processes many years before Pearl Harbor, have helped greatly in bringing the infant electrolytic tinning industry into maturity almost overnight."

"A year ago," the G-E engineer explained, "There were only two continuous tinning lines capable of handling strip 30" wide at speeds above 300 fpm. By the end of the year fourteen new lines will be in operation. By the middle of 1943 there will be 26—most of them designed to handle 36" strips."



**HERE'S  
YOUR  
HELPER  
ON  
WHEELS**

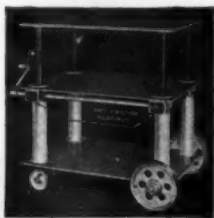
## PORTELVATOR

Portable Elevating Table

Load it with dies, tools, parts, work-in-process . . . a thousand jobs made easier and quicker with this "helper on wheels." Capacity up to 20 tons.

**THE HAMILTON TOOL CO.**

Ninth and Hanover Streets.  
HAMILTON OHIO

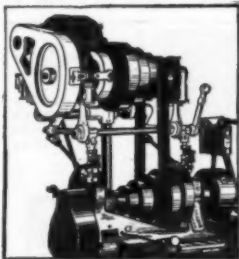


## Gorton "Spit-Fire" Arc Etcher

An improved electric arc etching process for permanent identification of parts, tools, etc is announced in a new bulletin by George Gorton Machine Co., 1317 Racine St., Racine, Wis. The new development, an all-purpose production etching machine, it is said, deeply etches hardened parts without burr in minimum time, and handles either light or deep etching by the turn of a dial.

"Spit-Fire" Model AE Machines are now in full production, with deliveries at present within 2 to 4 weeks.

Designed for either accurate, rapid, high production etching or



## What's different about Remco?

The method of changing speeds for one thing. Less noise the Remco way. No clash of metal-on-metal. Instead the motor takes hold gradually by slipping the belt—simple friction clutch action. You get the speeds you need. Shift quietly from one to the other without removing tool from cut in most cases. Less down-time, more out-put! Let your ears decide and you'll install Remco. Write: Remco Products Corp., State St. at R.R., York, Pa.

## REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



## WIREGRIP

### Belt Hooks

Have extra (painted) aligning cards that hold all hooks in position preventing card and waste—every hook is used.

### STEELGRIP

Flexible Lacing (the type applied with a hammer) in convenient boxes or long lengths with 2-piece hinged rocker pins.

Prompt Delivery on both types.

Write for Circulars

ARMSTRONG-BRAY & CO.

"The Belt Lacing People"  
5364 Northwest Highway, Chicago



## M & L PRECISION TAPPER

Taps guided by precision leads Class 3 & 4 specifications easily met. 4 speeds Ball bearings throughout. Available as floor model (with coolant system) or table model.

### International Inside Micrometers

Highest accuracy and finest workmanship. Available 1½"–6" & 1¼"–12" sets.

Brand Telescope Gages ½"–2½" Handy Knurler, used like pair of pliers.

### BRAND TOOL & SUPPLY CO.

344 No. Vermont Ave., Los Angeles, Cal.



Precision-built for tiny precision drilling

individual marking of soft to hard metals, including hardest steels, the versatility and capacity of the new Model A-E opens new fields of application. For example, the "Spit-Fire" arc has proved exceptionally efficient on highly polished and ground surfaces, making it possible to mark goods in the finished state.

Due to the extension arm design, it readily handles etching in previously inaccessible places, such as inside a cylinder, cavity, or along both sides of a V-block, etc. It is adaptable to etching a wide variety of sizes and contours, such as gears, connecting rods, gages, hardened pins, bushings, collets, etc. It has range for marking delicate parts such as .0015" feeler gage stock, up to the largest parts within capacity of the machine.

It is claimed that this etcher is the only machine capable of light or deep etching on flat or irregular surfaces, on concave or convex curvatures, without need of a forming guide—with self-adjusting vertical movement up to ¾" which automatically follows contours—at a speed of 120 arcs per second, with pantograph accuracy.

Etching depth is variable by one dial control from .0001 to .003" deep. Etching width is variable by diameter of electrode used from .0075 to .015". Gorton offers 3 sizes of electrodes, double-end style providing double life, and also suitable for use in javelin types. Average life is said to be approximately 4 to 5 steady work hours—less for a deeper etch, longer for a lighter etch.

Characters can be varied in height from 1/32" to much larger sizes. Operating on 110-120 volts, 60 cycles a-c

The HAMILTON

MUEHLMATT

Super Sensitive

DRILLING MACHINE

Helps save those irreplaceable small drills.

Dept. T-10

THE HAMILTON TOOL CO.

Ninth and Hanover Streets.

HAMILTON

OHIO

Unsurpassed for holes from .004 to 5/16" dia. Self-contained drilling unit, swings radially on column, locks to any position.

SPECIAL NAILS, RIVETS, SCREWS



Hassall

## PRIORITY IN EXPERIENCE

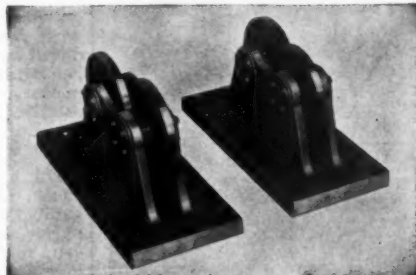
Special nails, rivets, screws and other cold-forged products made quickly and economically to your order. Facilities include those for swaging, fluting, knurling, milling, pointing, slotting, tapping and finishing. Send for catalog—no obligation. It will acquaint you with the possibilities of our inexpensive and better method. When you order from Hassall you benefit by ninety-two years of experience, embracing three previous national emergencies.

John Hassall, Inc., Clay and Oakland Sts., Brooklyn, N. Y.

## PILLOW BLOCK BALANCING WAYS

Especially suited for large diameter work, as a sub-base can be made of proper height to give necessary clearance for work.

Anderson Pillow Block Balancing Ways are precision built with chilled iron discs which rotate with minimum friction on sensitive special bearings. Many manufacturers have endorsed them for profitable, efficient, static balancing.



Built in 1000, 2000, 5000, 10,000  
and 20,000 Capacities

Write for Details

ANDERSON BROS. MFG. CO., 1917 Kishwaukee St., Rockford, Ill.



## LIVE CENTERS

Get more work, quicker out of machine tools with IDEAL Live Centers. They rotate with the work, therefore permit heavier loads—faster speeds—deeper cuts. Radial load carried by high precision ball bearing; thrust load absorbed by taper roller bearing. All parts hardened and ground.

### TRIPLE DUTY

Three interchangeable Center Pieces (illustrated below) for all kinds of centered and uncentered work. Save set-up time.



### OTHER WAR PRODUCTION SPEEDERS



**FREE—Machine Tool Accessories Catalog**  
**IDEAL COMMUTATOR DRESSER CO.**  
 1441 Park Ave., Sycamore, Illinois  
 Sales Offices In All Principal Cities  
 In Canada: Irving Smith, Ltd., Montreal, Quebec

only, etching voltage is variable from 3 to 9 volts, less than that used by most toy electric trains, offering complete safety of operation. Current consumption is only 25 watts, maximum.

The etching is done by a tiny tungsten wire electrode oscillated vertically 120 times per second by a magnetic motor. Each time the electrode touches and leaves the metal work piece, a high-amperage electric circuit is made and broken, creating an extremely hot arc. Simultaneously, as electrode is moved by pantograph over the work, a steady succession of overlapping tiny craters form the etching. Depth is controlled by amount of current; width by diameter of electrode selected. The moving intermittent electric arc removes the metal by decomposition, leaving a clearly legible mark or black groove.

The A-E is a complete etching machine, featuring quick set-ups and easy operation. Of importance today is the fact that an unskilled operator, can produce legible work rapidly after a few minutes' reading of the simple directions and a little practice. Usually no preparation of the work is required and only a simple holding fixture is needed. Operator needs only to trace along lines of the master with one hand, and with the other, hold the feed button down—the pantograph and etching unit do the rest. The etcher electrode wire reproduces the "tracing" in reduced size, controlled by setting of the pantograph. Thus, using one large master, a steady succession of pieces can be rapidly and precisely marked in reduced size with maximum production per hour.

The machine is furnished with a choice of either 3:1 or 6:1 fixed ratio pantograph. Areas covered by the etcher electrode point are, for 3:1 ratio:—up to a 5" dia. circle, a 4-1/2 x 5" rectangle, or 4x8" long strip; or, for 6:1 ratio: up to a 3" dia. circle, a 2-1/4 x 4" rectangle, or 2x5" long strip. (An adjustable Pantograph providing any reductions from 3:1 to 100:1 and covering the same areas, and smaller, is optional at extra cost). Dimensions of machine are:—Vertical capacity, spindle to table: with screw 0 to 10", with-

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Speed production! Save hours and dollars now spent on copying and tracing originals. Get your copies without delays—made in a few minutes right in your own department. APECO makes copies up to 18x22" photographically. 1 to 100 copies or more. No chance for error! No need for proofreading! Acceptable to engineers and Courts of Law. Used today by leaders in industry.

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# APECO \$55

WT. 10 LBS.

## AMERICAN PHOTOCOPY EQUIPMENT COMPANY

2849 N. Clark St. Dept. C-2 Chicago, Ill.

out screw 0 to 13- $\frac{3}{4}$ ". (Larger capacity may be obtained with special Long Column Slide, optional at extra cost). Normal distance, spindle to column face:—for 3:1 fixed ratio, 9- $\frac{1}{2}$ "; for 6:1 fixed ratio, 6- $\frac{1}{2}$ ". Size of Work Table, 8 to 12", with  $\frac{3}{8}$ " milled longitudinal T-slot at center and four 7/16" diagonal cored slots. The entire machine occupies a floor space of only 31 x 29 wide x 44" high.

A new portable unit, consisting of Etcher Head and Control Panel in compact carrying case, with built-in transformer, switches, cables, pilot light, extra wire, tube of 36 electrodes in assorted sizes, complete, is furnished as standard equipment for Model A-E with the etcher head attached directly to pantograph. However, for those already owning a pantograph machine, the entire "Spit-Fire" Portable Unit may be purchased separately, as it is designed to fit any conventional pantograph, Gorton or other makes. The portable unit covers the same areas as the machines on which it is used, and may be quickly attached.

## N. M. T. B. Officers

John S. Chafee, Vice President Brown & Sharpe Mfg., Co., Providence, R. I., was elected President of the National Machine Tool Builders Ass'n. at the Association's recent annual meeting.

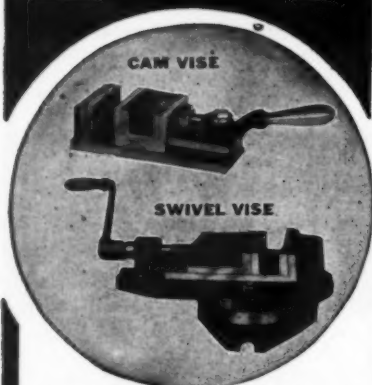
Walter W. Tangeman, Vice President of the Cincinnati Milling Machine Co., Cincinnati, Ohio, was elected First Vice President. Fred H. Chapin, President, National Acme Co., Cleveland, Ohio, was elected Second Vice President; and David Ayr, President, Hendey Machine Co., Torrington, Conn. was elected Treasurer.

New directors elected to the Board were: Joseph L. Trecker, Vice President, Kearney & Trecker Corp., Milwaukee, Wisc., Mr. Tangeman and Mr. Chapin.

Tel Berna continues as General Manager, and Mrs. Frida F. Selbert as Secretary.

## BUY WAR BONDS AND STAMPS

# Precision Built "MODERN" VISES



"MODERN" VISES are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

**CAM VISES**—Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".

**SWIVEL VISES**—Jaw dimensions: width 4", depth 1½", maximum opening 3". Can be used without base.

*Write for folders.*

MANUFACTURERS OF PRECISION HIGH SPEED STEEL  
AND CARBIDE CUTTING TOOLS.

**MODERN TOOLS**  
EAST BERLIN CONN.

## Asbestos-Faced Board

A board of laminated construction, product of a prominent research laboratory and said to be a valuable alternate for sheet metal, is receiving wide attention.

Tests are reported to have demonstrated that the product is rustproof, moisture-resistant and strong; that it meets fire tests of Federal Spec. 55-A-118 (Fire Retardant) and has important advantages for many industrial applications.

Finished in white asbestos felt on both sides, it is said to be attractive in appearance and to save, in many instances, the cost of additional finish. It is claimed that the board readily takes the usual casein or cold water paint and, after sizing, lead and oil.

The board is available, according to the manufacturer, in sheets 33" wide and 60" long, especially suited to standard joist spacing of 16".

This material known as A-D Board, is a product of The Philip Carey Mfg. Co., Lockland, Cincinnati, O.

## WIPE OFF RUST and BURNS WITH SOL-KLEAN

Simply wet a rag with Sol-Klean and wipe away all Stains, Burns and Rust.

NON - INFLAMMABLE  
NON - TOXIC  
NON - CORROSIVE

**INDUSTRIAL CHEMICAL  
PRODUCTS CO.**

DETROIT  
Ft. Wayne Milwaukee

New-  
Different-  
Adjustable-  
Economical!

## MASTER FEED FINGERS For Automatic Screw Machines

cover the entire range  
of your screw machines  
for a few inserts.

- Feed all shapes
- Easy to load
- Hold at high speed
- Greater grip area
- No rebound
- Can't mar stock

### NO SEARCHING FOR FINGER AND PADS

A real production speed-up with new and exclusive features. Solid, long-wear, break-proof construction. No moving parts, no springs. Adjustable by simply selecting insert nearest stock size, inserting into finger, applying tension ring and placing on machine. Soft composition contacts prevent marring of stock . . . . . Order now. Satisfaction guaranteed.

Available from  
stock for most  
popular makes and  
sizes of single or  
multi-spindle  
screw machines.

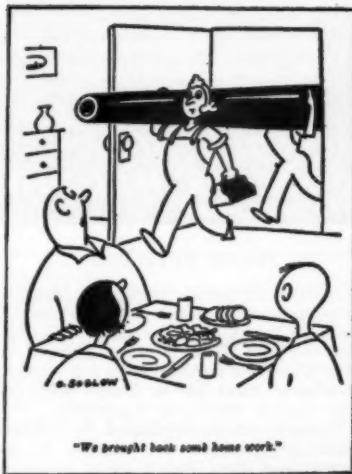
## GREEN MANUFACTURING CO.

P. O. BOX 704 ROCKFORD, ILLINOIS

SEND FOR BULLETIN  
GIVING DETAILS

### Small Parts Furnace

Plants finding their commercial heat treating equipment exhausted, have discovered that they can install small, inexpensive furnaces to handle most of their treating of small parts. Developed to meet this demand, is an industrial muffle-type furnace, detailed in a bulletin offered by Cooley Electric Mfg. Corp., Indianapolis. The furnaces are available in 2 sizes, can be installed easily and mounted on a metal table. Heating elements, fully protected and removable, consist of rectangular refractory blocks in which nickel-chromium resistors are embedded. The embedding material, it is claimed, affords high thermal conductivity for rapid heat diffusion and electric insulating properties at high temperatures. Claimed, also, are utility, efficiency and economy features comparable with those sought in the larger furnaces.



Drawn for the Office of War Information



# Douglas

**PRECISION SLOTTER**  
BUILT WITH 7", 8", 10" STROKE



READY FOR  
PRODUCTION

SWIVELING RAM HEAD AND TOOL HOLDER, AUTOMATIC CIRCULAR  
TABLE AND INDEPENDENT AUTOMATIC FEEDS IN ALL DIRECTIONS

EARLY DELIVERY BY LARGE SCALE PRODUCTION

**DOUGLAS MACHINERY CO. INC.**  
150 BROADWAY NEW YORK, N. Y.

## Nickel Substitute

Twenty thousand pounds of nickel—enough to make armor-plate for 55 medium tanks—will be conserved this year by the Westinghouse Electric & Mfg. Co., thru substitution of a newly-developed steel for a nickel alloy in war-needed electronic equipment.

Hipersil steel—developed by Westinghouse originally for electric transformers—is now being used in place of a nickel alloy in the manufacture of Ignitrons, devices for converting a-c

to d-c for manufacturing two vital war metals, aluminum and magnesium. Ignitrons also supply direct current to electric locomotives, steel mills, street cars, subway cars, printing plants and for spot welding.

In former years one part of the Ignitron equipment—the reactor—was made of an alloy containing about 50 per cent nickel. But when it became apparent that more and more nickel would be needed to make the steel alloy used in armor-plating tanks and battleships, the firm started searching for a substitute material.

When Hipersil steel was tried, it performed as efficiently as the nickel alloy and turned out to be more satisfactory under changing temperature conditions. Magnetic properties of Hipersil are not materially affected by temperature changes, which range in the reactors from 70 to 200°F.

A special silicon steel, Hipersil is produced by certain melting, heat treatment and rolling techniques that rearrange its crystals and improve its magnetic properties—a process that enables a small amount of Hipersil steel to do the job of a larger amount of ordinary electrical steel.

The process changes the crystals from random patterns to oriented.



## Doall at the Metal Show



Models—exact replicas—of Doall Contour Sawing and Filing Machines were featured in the Continental Machines exhibit at the recent National Metals Congress and Exposition in Cleveland. The models were shown because Continental felt they could not permit these vital war machine tools to be taken from their shipping schedule. Then too, it conserved space at the Exposition but also valuable space during shipment to and from the show.

Also featured were the Doall Educational Aids on machine tools and shop practices offered free of charge to our government and industries. Special emphasis was given the Doall Trade School and its 5 weeks' course

of free training. Civilians and a 120 men in our armed forces are receiving intensive training every 5 weeks.

## Vernon 7" ROTARY TABLE



Precision ground top and bottom—Substantially ribbed. 4 table quadrants calibrated 0 to 90° each. Friction loaded worm dial graduated in 240 minutes. Overall height only 2 3/4". Write for folder!



## Flexoid TOOL HOLDER Universal Head

"ONE TOOL DOES IT ALL"

Entire assembly including bit is rigidly locked by a single screw.



Does away with right, straight or left hand tool holders. No change in centers necessary when resetting—5 sizes.

STOCKED FOR IMMEDIATE DELIVERY

THE SMITH POWER TRANSMISSION CO. (PST)

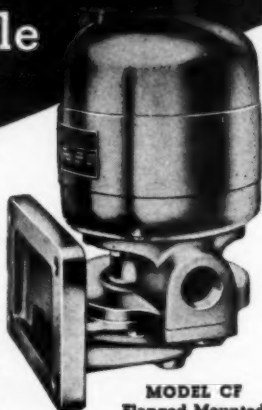
Write for folder  
1545 E. 23rd ST.  
CLEVELAND, OHIO

# GILBARCO COOLANT PUMPS

dependable...  
durable

- One of a complete line of pumps for all machining operations.
- Built for twenty-four hours a day service.
- Instantaneous coolant delivery, self-priming, never becomes air-bound.
- Does not build up pressure at slow speeds.
- Positive mechanical seal, ball bearings throughout—unharmful by running dry.
- Built by one of the country's largest pump manufacturers.

Write or wire for literature, prices and deliveries.



MODEL CF  
Flanged Mounted

GILBERT & BARKER MFG. CO.

WEST SPRINGFIELD, MASS.

## Belt Tension

Two methods are available for adjusting the tension of a belt, without taking anything out of the belt itself. One of these is the use of some sort of wrapper pulley, which automatically adjusts itself to a belt as it varies in length due to changes in humidity. Thus, it takes up excess length by wrapping belt around pulleys of the drive a little further. The other is employment of some method of increasing or of decreasing distance between centers of pulleys. The 1st

method is ideal in many cases. The 2nd is better in others. There are special wrapper pulley drives obtainable commercially. Many have employed them with profit.

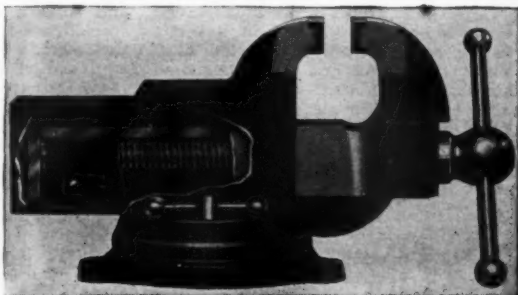
There are different ways to increase center distances between pulleys. We are all acquainted with ordinary sliding motor bases. Here the bolts holding motor may be loosened, and motor pulled with a screw to increase belt tension. There is another form, however, which is far better. Without manual attention, it compensates automatically for belt length changes due to variations in humidity. This is the type of drive in which the motor is mounted on a pivoted or rocking base, with weight of the motor so arranged as to positional relationship with the pivot point that it holds belt

tightly. One firm supplying this type of drive has installed thousands on all kinds of machinery.

There is the occasional instance where a small belt must be run on short centers, and where neither of the methods mentioned above can be used. One such was encountered on a special grinding assembly designed for use with a standard grinder. The assembly or attachment was used for grinding small radii in gages, etc. A special bracket held the grinding spindle in alignment with driving shaft.

## Pacific Quick-Action Vise

Considerable time is consumed with "grinding" vises changing jaw openings when working on parts of varying sizes. This point is stressed in connection with a new line of Pacific Time Saving Vises recently introduced to speed up vital war work. The quick-action principle involves use of a patented nut pawl which makes it possible to open and shut the vise like a drawer and to lock it in any desired position with only 2 turns of the handle. When pawl is engaged on the steel rack (as shown in the illustration) it is in working position and ready to grip the part. Two left turns of the handle disengage the pawl and permit opening and closing the jaws freely to fit the part to be gripped.



Only 2 right turns are needed to re-engage pawl and grip the part firmly. It is estimated that up to 30 minutes per day can be saved for each vise operating on varied size parts.

The Vises are of extra rugged construction. Castings are of semi-steel. All working parts are of steel, precision

### "ALNOR" Velometer An All Purpose Air Velocity Meter —Instantaneous, Direct Reading.

Measures total and static pressures as well as velocities.

write for catalog  
ILLINOIS Testing  
Laboratories, Inc.  
150 W. Hubbard, Chicago



## SCHAUER Speed Lathes

Variable Speed

Ideal for tapping  
filling, polishing  
small metal and  
plastic parts.

Write for  
Catalog 420.

Schauer Machine Co.  
2064 Reading Rd.  
Cincinnati, Ohio



## BAND SAW WELDERS

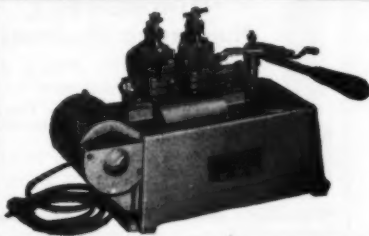
The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to 3/4" wide may be welded.

1 KVA—110 Volt—60 Cycle—single phase—  
5 point heat control—1 point anneal heat—  
Weight 40 lbs. Let us send you further details.

Mfrs. of complete line of Spot, Butt, Seam, Flash,  
Projection and Special Welders.

**WELDEX INC.,**

7325 McDONALD AVE.,  
DETROIT, MICH.



machined, fully enclosed and all parts are interchangeable. The makers emphasize that the buttress threaded screw is entirely enclosed in a single casting and is firmly supported at 3 points, (front, nut and back) to maintain correct alignment under all conditions and to provide added gripping power without strain. A new type swivel base locking bar with 2 screws assures a positive lock in any position and equalizes strain.



**TRICO OILERS**

**KEEP UP PRODUCTION**

Accurate—dependable lubrication... no guess-work, bearing failures, idle machines or waste when TRICO OILERS are installed.

**WRITE FOR BULLETINS**  
**TRICO FUSE MFG. CO.**  
**MILWAUKEE, WIS.**

**T. H. L. FRONT LEVER BENCH PUNCH**

Built for hard, tough work—die cannot lose alignment with punch—all parts interchangeable.

Capacity—  
 1/2" holes through 3/16" steel; 13/32" through 1/4" steel. Can also be made for holes up to 7/8" in thinner metal. Stock punches and dies available from 1/16 to 1/2" by 64ths. Weight, 70 lbs.

**T. H. Lewthwaite Machine Co.**  
 (Est. 1890)  
 311 E. 47th St.,  
 NEW YORK

**PRICE WITH ONE PUNCH AND ONE DIE—**  
**\$50.00**  
 Immediate Shipment.



The vises are available in 3 sizes—4½", 6" and 7"—in both swivel base and solid base types. In addition, a special wood worker's vise is offered that swings to any desired position, is equipped with 3 wood faces and a metal jaw, and embodies the same quick-action principle.

The makers are the Pacific Vise Co., 6331 Hollywood Blvd., Los Angeles, Cal.

## Two New Stanley Catalogs

Electric Tools For Industry, is the title of Catalog No. 67, by Electric Tool Div., The Stanley Works, New Britain, Conn. The book is a prolific exhibit of electric hand drills of which, alone, some 15 models are shown together with accessories and attachments. About a third of the book is given over to the extensive line of grinders, and attachments, followed by electric screw-drivers, hammers, saws and uni-shears. Complete specifications and data covering each machine are given, and the book is liberally illustrated with on-the-job examples of many of the tools in application.

The other catalog, No. 605, is entirely devoted to the firm's router-shaper, a compact hand-machine electrically driven. This book is a treatise on routing, shaping, relief work, dovetailing, inlay, templet and other woodworking operations which can be performed, according to the firm, with the router-shaper. Detailed plans are given, covering many specific operations, aimed to save time and effort on jobs of this kind.



**NUMBERALL**  
**Numbering Machines**

*Automatic and Hand Operated*

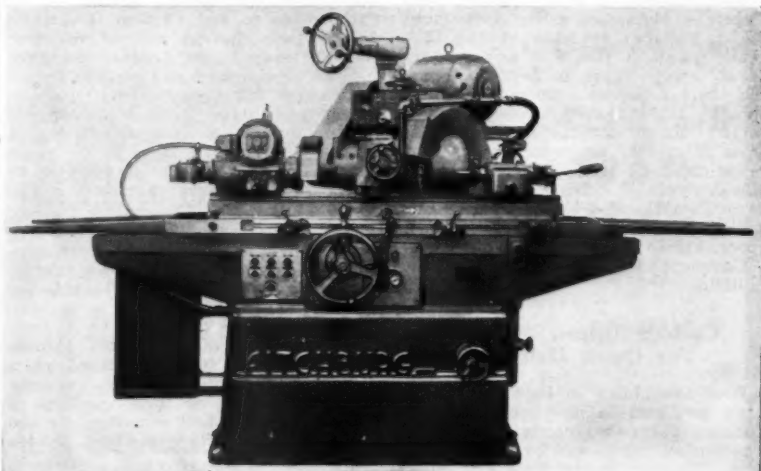
for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.

For Marking Metal Parts, Name Plates, Metal Checks, etc.

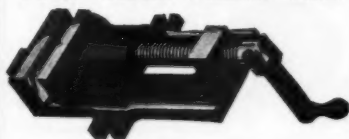
**Write for Catalog.**

**NUMBERALL STAMP & TOOL CO., Inc.**  
 Huguenot Park, - - - Staten Island, N. Y.

## New Angular Grinder Announced by Fitchburg



## YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, inches	Opens inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

**YOST MFG. COMPANY**  
1335 SO. MAIN ST.  
MEADVILLE, PENNSYLVANIA

With working diagrams, showing how set-up, handling and running time can be saved by its Bowgage method of automatic precision grinding, a new bulletin offered by Fitchburg Grinding Machine Corp., Fitchburg, Mass., announces new Type C, Adjustable Angular Head model.

Newest of Fitchburg's plain, cylindrical grinders, type C is designed to handle a wide range and a number of types of jobs. It has standard wheel-head unit, mounted so as to permit location to grind from 0 to 45° angles. Bowgage head is adjustable to various positions for standard, plain grinding. Head goes thru a completely automatic cycle—rapid traverse to work, correct feed, grinding dwell and rapid return. Workhead is adjustable for varied lengths of work, and work spindle can be equipped for single or variable work speeds. Truing device is hand-operated and mounted on the work table.

Accuracy, ease of adjustment and rugged construction making for efficient operation are claimed for the machine, designed to meet wartime

production speed and efficiency demands.

Specifications, 6 x 32" Swivel Head Type: — Maximum swing over table, 8¾". Distance between centers, 32". Work speeds, 5. Range of work speeds, 64-327 rpm. Taper in footstock spindle, No. 3 Morse. Diam., footstock spindle, 1¾". Swivel table graduated to 10°. Range of table speeds, infinite from 28 to 188" per min. Spindle lubrication, flood feed. Size of grinding wheel, 20x2x12". Wheelhead traverse, 0 to 5". Wheelhead swivel, 45°. Capacity of coolant tank, 29 gal. Floor space, 110x68". Net wt., 6,500 lbs.

Complete data is contained in the bulletin.

### Carbide Tipped Reamers For Quick Delivery

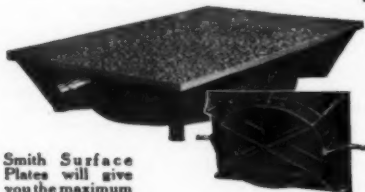
With availability of tools one of the basic problems in war production industries, particular interest attaches to a recent announcement by H. E. Berry, Sales Manager Super Tool Co., 21640

Hoover Road, Detroit. The Company, which was growing rapidly even before the present emergency, devotes all of its energies to manufacture of carbide tipped tools and is one of the few manufacturers in this business carrying a stock of standard size carbide tipped reamers at this time. Mr. Berry's announcement states that because of this well-maintained stock of carbide tipped reamers, it is possible to make quick deliveries on sizes ranging from ¼ to 1¼", including special diameters within these limits.

These reamers are offered with carbide tips suitable for cutting steels; also with another grade of carbide for cutting other materials.

The reaming of steel with carbide tipped reamers is now offered as a thoroly successful operation, making possible the use of their qualities of speed, accuracy, and economy, for the maximum production so vital to today's schedules.

### IF ACCURACY -- PLUS IS WANTED-- GET **SMITH MASTER** SURFACE PLATES



Smith Surface Plates will give you the maximum freedom from distortion with a minimum of deflection. Original design insures ample rigidity and stiffness for accurate measuring. Smith Surface Plates are satisfactorily meeting the tests of the country's leading precision toolmakers. You'll want detailed information and descriptive literature. Sent free on request.

**SMITH TOOL & ENGINEERING CO.**  
(Formerly Smith Tool Works, Inc.)  
848 N. Sandusky Ave. Bucyrus, Ohio

#### AVAILABLE SIZES

8" x 12"  
9" x 14"  
12" x 18"  
18" x 24"  
18" x 18"  
20" x 30"  
24" x 24"  
24" x 36"  
30" x 36"  
30" x 60"  
36" x 60"

Other sizes made on order.



### CUB

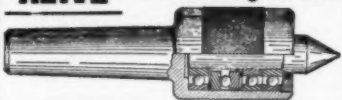
#### VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. See your dealer or write \$16.50

(3 Type—8 sizes to choose from)

**Standard Transmission Equipment Co.**  
3409 VERDUGO ROAD LOS ANGELES, CALIF.

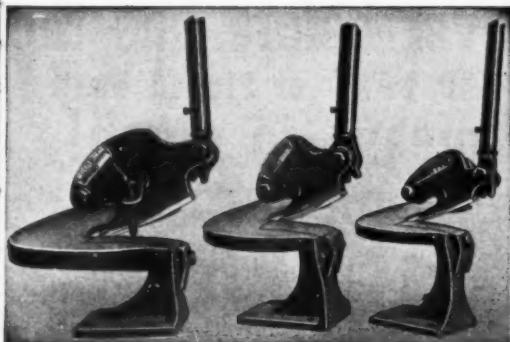
### "ALIVE" Ball Bearing Centers



**"They turn with the work"**

Write TODAY—and let us tell you more about them.

**MODERN MACHINE CORP.**  
323 Berry St., Brooklyn, N. Y.



**Speed-Up  
WAR  
ORDERS**  
with

## BEVERLY THROATLESS SHEAR

If you're cutting straights—rounds or irregulars on War orders you can speed 'em up and eliminate distortion with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16" mild steel and 10 ga., stainless.

**BEVERLY SHEAR CO., 3005 W. 110th Pl., Chicago, Ill.**



## Heavy Duty Spot Welders

Floor models  
10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

Bench models 2½ to 10 KVA.—with or without pedestal.



**PROMPT  
DELIVERY**

*Few  
Territories  
Available.*

Dyer Welders are available in a wide range of sizes and capacities—air, motor or foot operated, giving maximum production—simplicity of operation—power economy.

300-322  
Jackson St.

**THE TOPEKA FOUNDRY & IRON WORKS CO.,**

Topeka,  
Kansas



### Bearings

Bearings with which any machine or piece of equipment is fitted, are a very important part of its mechanism. Ball and roller bearings have played a tremendous part in saving power thru reduction of frictional resistance. In some shafts and spindles which must turn with extreme truth, it has been found wise to preload bearings of ball type. This is done on an outstanding highspeed precision lathe, favorably known for dependability.

Outboard bearing supports are quite a problem in many cases. In one, where a brake drum lathe was to be used for turning the drums on heavy truck and bus wheels, it was needful to provide an outboard bearing. The only way it could be done was to support the bearing directly from the base. Therefore, the manufacturer of this machine extended the base, and provided 2 swinging-arm supports from the 2 front corners of the base. When in place, these 2 arms, together with the base, formed a triangle, thus giving great rigidity to the support.

Have you ever seen a bearing arranged to allow a shaft or spindle to give back, endwise, under pressure? Such provision was needed in a spindle on a tool grinder devised to han-

# Never before has the RED BAND of Proved Merit meant so much!

## Another Exclusive Feature of *Cebresive* RED-BAND DIAMOND TOOLS



- DRESSING TOOLS
- BORING TOOLS
- FORMING TOOLS
- PHONOPOINTS
- GAUGE TOOLS
- LOOSE DIAMONDS
- Special DIAMOND TOOLS  
To Your Specifications

**IMMEDIATE DELIVERY!**

*Write Today For Catalog  
And Latest Price List!*

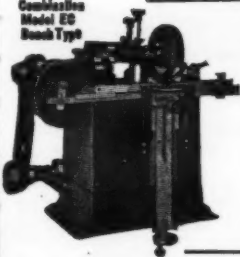
*Cebresive* DRESSING  
TOOL CO.  
DETROIT • MICHIGAN

dle tungsten carbide and highspeed steel tools. To insure that the tungsten-carbide tools would have only light even pressure against the cup-wheel, the shaft was fitted with a spring-cushioned thrust bearing, loaded to give back when the pressure reached a given point. Thus, it is impossible to exert too great pressure against the face of the wheel.

**Editorial Note:** Machines mentioned identified on request.



Combination  
Model EG  
Bench Type



## SHARPEN YOUR OWN SAWS

**SAVE OVER 80% ON SHARPENING  
HACK, BAND, CIRCULAR SAWS**

The **WARDWELL SAV-A-SAW** automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

*Write for complete information*

**THE WARDWELL MFG. CO.**

3165 FULTON RD.

• CLEVELAND, OHIO

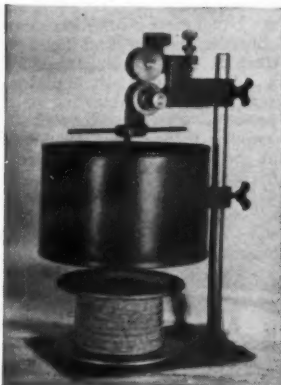
### High Speed Fine Wire De-Reeler

Anyone familiar with de-reeling wire from supply spools at high speed has a genuine respect for the difficulties involved. Real difficulty is encountered in taking fine wire (as small as

No. 42) in intermittent, uneven flow, yet providing uniform tension, free from kinks, broken wire, damaged insulation, stretched or hardened wire—at high speeds without over-run.

As illustrated, the unit is available in 2 sizes:—the No. 1 for 3" and the No. 2 for 4 to 6" sized supply spools and is recommended for wire sizes of from No. 26 to 42 gauge.

The addition of this item to their line rounds out the products offered by The Globe Tool and Engineering Co., 432 Davis Ave., Dayton, Ohio, whose lines consist primarily of all types of coil winders, armature winders and dynamic balancing machines.



### Aero Speedball Driver

Aero Tool Company, Burbank, California, has a new high-speed, ball bearing driving tool by above name. According to the manufacturer, assembly jobs are greatly speeded by this tool which drives screws, countersinks, or removes burrs. Replaceable tips,



### Mill Over 1,000 Parts Per Hour

WITH THE

#### **NEW Dearborn Automatic Chucking and Indexing Fixture**

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

**J. W. DEARBORN**

72 S. CLIFF ST.

ANSONIA, CONN.

## FOR REMOVING BROKEN TAPS

### Quickly—

Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

### Easily—

Tap Extractor and Tap Wrench are only tools needed.

### Safety—

Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

Folder 131 gives complete details.



**The Walton Co.**

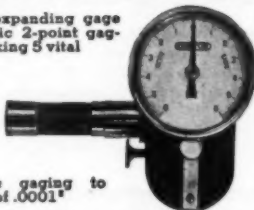
95 ALLYN STREET,  
HARTFORD, CONN.

Widely used for ordnance,  
airplane, automotive, etc.

## COMTORPLUG

Internal expanding gage—automatic 2-point gaging, checking 5 vital factors.

Sizes:  
 $\frac{1}{4}$ " to 7"  
dia. and  
larger



Automatic gaging to  
fractions of .0001"

Comtorplug offers utmost simplicity and accuracy in gaging bores to fractions of .0001". Operated successfully by inexperienced hands, its unflinching accuracy automatically provides 2-point gaging, showing ACTUAL SIZE of diameter, as well as revealing such irregularities as out-of-round, front or back taper, barrel shape, bell mouth. For MAXIMUM production, give Comtorplug to machine operators, as well as inspectors.

Request Bulletin 27

**THE COMTOR CO.**

62 Rumford Ave., Waltham, Mass.



conveniently stored in recessed handle, give the tool a wide variety of uses.

The driver is supplied in several shapes for special work with tips for Phillips Screws, slotted-head screws, set-screws, or for burring and countersinking. Tapered shank on tip allows easy removal but will not permit tip to turn in tool. Smooth, easy, non-slipping action is assured by balanced design.

## Unichrome Folder

An informative 6-pg leaflet describing the Unichrome alkaline copper plating process, can be had for asking, from United Chromium, Inc., 51 E. 42nd St., New York. It explains its characteristics in deep-drawing of steel parts, where a ductile, adherent coating of copper is required to act as a lubricant between work and drawing dies. Also outlined is how the dense, fine-grained deposits, this process is said to produce, afford valuable aid in selective carburizing of gears, shafts and other steel parts.

In addition, the leaflet announces a new Unichrome alkaline stripping bath in which copper coatings can readily be removed at speeds up to .001" in 10 minutes or less, without effect on the steel base metal.

## Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular  
**NIELSEN TOOL &  
DIE COMPANY**  
1859 Gardner Ave.  
Berkley, Mich.

**SPEEDS PRODUCTION! CUTS TIME AND COSTS!**

## **SPEEDY AIR VISE**

**FAST! POWERFUL!  
FOOT CONTROLLED!**

Most important vise design in years! A fast-action, hard gripping air vise that speeds production; saves time, labor and costs! Speedy Air Vise operates from air line or individual compressor, exerting a grip of 15 times air pressure! Jaw opening adjustable up to a maximum of 3 inches. Maximum travel of 1/2 inch assures rapid insertion and removal of work. Employs no piston, but instead a long-life, multiple-type diaphragm... eliminating friction loss, air leakage and slippage. Rugged, compact, low priced, it is the ideal vise for speeding up numerous operations.

### **HAND FREE OPERATION!**

● Foot operation leaves BOTH hands free for fast insertion and removal of work. Vise stays open or closed without constant foot pressure.

Complete with Foot Control Valve, Air Hose and Fittings

**\$24**

**Write at Once For Circular B-10**

**W. R. BROWN CORP., 5720 ARMITAGE AVE., CHICAGO, ILLINOIS**

**In These  
Days of  
SCARCITY...**

## **KNIVES MUST LAST LONGER**

### **Rogers Grinders Conserve Knives**

Sharpen your own knives and be independent of delays, higher costs and unnecessary wear! Finely adjusted automatic control assures keen cutting edges... with minimum removal of metal. No skilled operator required.

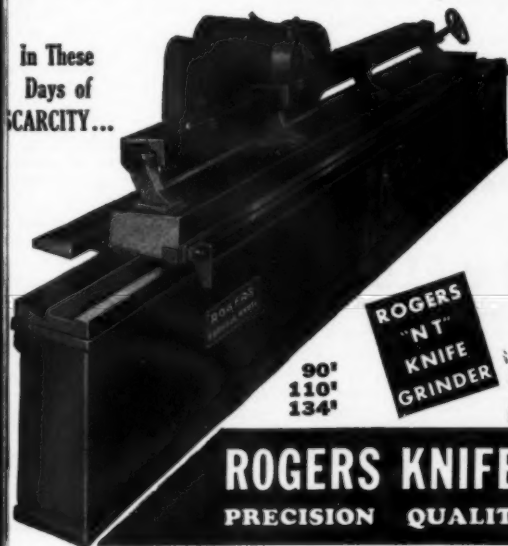
Reasonable shipments to high priority holders... subject to our obligations to war production industries. Also manufacturers of circular knife and band saw sharpening equipment.

**SAMUEL C. ROGERS & CO.**  
297 Dutton Ave., Buffalo, N. Y.

**ROGERS KNIFE GRINDERS**  
**PRECISION QUALITY SINCE 1887**

**ROGERS  
"N" KNIFE  
GRINDER**

**90"  
110"  
134"**





## FASTER SPOT WELDING Makes up for Man Shortage

Faster spot welding with Ace Spot Welders is providing many manufacturers with greater production per man-hour and increasing weekly output. Ease of operation makes it possible to develop expert operators quickly.

Ace Welders are production tools designed for today's needs for steady, fast output. They are made in a wide range of capacities, in both manual and automatic motor-driven types.

Write for Catalog 40

**PIER EQUIPMENT MFG. CO.**  
1458 MILTON STREET, BENTON HARBOR, MICH.

PEER  
**ACE SPOT WELDERS**

### Oscillograph

But for a delicate little instrument known as the oscillograph, says Ohmite News, Ohmite Mfg. Co., 4825 Flournoy St., Chicago, knowledge of electrical phenomena, especially concerning alternating current, would not be as complete as it is. The oscillograph is used for recording wave forms in electrical current.

Present day instruments of this kind,

continues the article, use the same principle employed by Wm. Duddell, who developed the first oscillograph in 1894. The device consists of a moving coil galvanometer, combined with a rotating or vibrating mirror and a moving photoplate or film. Vibrator is made of 2 parallel conductors of thin phosphor bronze, looped over a pulley. A very small mirror is attached to both the strips, and the assembly mounted between poles of a powerful magnet. A guide-block, placed at tops of pole-pieces, limits vibration of the conductors to the portion directly within the magnetic field. When current is passed thru the strips, one advances, while the other recedes, causing mirror to rotate about a vertical axis.

The entire vibrator is immersed in oil, to damp its movement. A source of light is so arranged that its

beam is reflected by the mirror to the photoplate or film. When an alternating current passes thru the strips, the spot of light, reflected from the mirror, oscillates back and forth, as current varies. When the photofilm is moved at right angles to direction of motion of the spot of light, an image of the current wave form results.

Duddell's contributions to electrical science were widely recognized.



## STOP DUST from All Kinds of GRINDERS with DUSTKOP

**DUSTKOP** collects dust from Surface, Tool and Precision grinders . . . Compact, self-contained . . . Operated by  $\frac{1}{4}$  hp continuous duty motor and fan . . . Easily renewable, spun glass filters clean air . . . **LOW IN PRICE** . . . Immediate deliveries of standard units on high priorities.

**AGET-DETROIT MFG. CO.**

2042 Book Tower Cadillac 3090 Detroit



## Featherweight Helmets Protect Soldiers

Weighing less than 12 ounces, plastic helmets now being made by Westinghouse for Uncle Sam's soldiers are tough enough to withstand a force of

15 foot-pounds. That's the same as stopping a pound weight dropped 15 feet. Worn during combat as a liner inside a 2-pound steel helmet, the cloth and resin plastic headpiece provides insulation against heat. During non-combat service, only the lightweight liner is worn as a head covering.



Production Manager C. Somogyi explains the new "War Finish" on milling machines to The Blue Book's roving Editor, Wesley G. Paulson, during a recent visit to the Cincinnati Milling Machine Co.



## **Removes burrs from inside and outside edges as fast as parts can be handled!**

**U**SED ON any machine, the smooth, clean, cutting action of the NOBUR will pass the most critical inspection. NOBUR is a time-saving, mistake-saving shop tool that eliminates slow, costly hand methods of burring. It lowers production costs and increases production by hastening approval of finished parts. Easy to operate...no skilled help is necessary...green 'trainees' or women operators can do burring with speed and accuracy...NOBUR minimizes costly reworking and enables the operator to do more in less time...NOBUR is simple in construction...rugged...important parts are hardened and ground...shaft is finished to a diameter slightly under its basic size...double-edged cutting blade is of special tool steel, cuts freely in either alloy steels or soft metals. Order through your distributor NOW...or write for literature direct to the

**NOBUR MANUFACTURING CO.**  
910 No. Orange Drive • Hollywood, Calif.



### **Rayon**

Functioning as mechanical packing material to seal against entrance or escape of water, brine, oil and other fluids, ropes of rayon are performing many hidden but vital war tasks. In numerous instances they are serving as well or better than packing they have replaced, according to advices reaching the Du Pont Rayon Department, which developed the special form of rayon used.

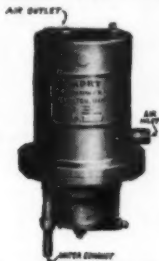
show very low abrasion to the metal shafts they enclose, and can be obtained in almost unlimited quantities.

Traditionally, this was a job for ropes of imported, long-line flax, impregnated with lubricants. War time shipping troubles reduced the supply. The demand, however, stepped up enormously, with expansion of the nation's war plants. DuPont rayon technician stepped into the problem, cooperating with several makers of packing.

The rayon packing helps retain the high operating pressures of hydraulic shears, punches and presses as they stamp out airplane parts and other military equipment. Columns of the rayon material fit snugly around shafts of accumulators which build up the tremendous hydraulic power. This type of equipment is used extensively in the war effort where high pressures are needed to stamp out metal parts. Rayon packing made up properly is suitable for hydraulic elevators, for the big pumps at the "water works" and for thousands of other pumps, great and small, throughout industry.

The product is known as Type 126. The smooth unbroken filaments of rayon

## WATER removed from AIRLINES AUTOMATICALLY WITH THE MURPHY SEPARATOR



Sizes  $\frac{1}{2}$ " to 4" Pipe

Literature and Prices on request.

**RESULTS — — — GUARANTEED  
NO ABSORBENTS — NO CHEMICALS**

**JAS. A. MURPHY & CO.  
HAMILTON, OHIO**

## New Britain UNIVERSAL VISE

Swivels 360 degrees horizontally,  
100 degrees vertically, to  
give any angle or com-  
pound of  
angles.



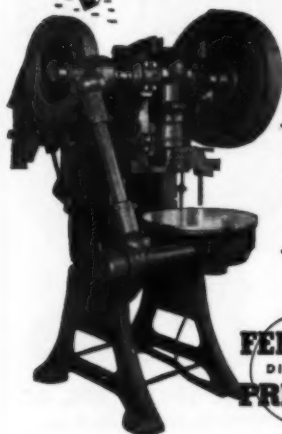
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Further  
Information.

**NEW BRITAIN TOOL & MFG. CO.  
NEW BRITAIN, CONN., U. S. A.**



The Doall Library of Maintenance Manuals, enclosed with every Contour Sawing and Filing Machine placed with our government and industry suggests how machine tool builders can ease the load placed on plant superintendents, engineers and purchasing departments in keeping machine tools operating effectively.

# V for Variety of jobs they can do



- ★ Burnishing
- ★ Forming
- ★ Marking
- ★ Staking
- ★ Assembly
- ★ Combinations

**FEDERAL**  
DIAL FEED  
**PRESSES**

FEDERAL Dial Feed Presses are now performing many jobs which formerly were not thought of as press operations — primary, secondary, and assembly work; in some cases, intricate combinations of all three. Burnishing, forming, staking, and high speed marking are handled with ease. Versatility is practically unlimited. Fast, safe, smooth and precise, these presses are speeding war production in hundreds of plants. Write for literature today.

**THE FEDERAL PRESS CO.**  
811 Division St., Elkhart, Indiana.

## 9 FEDERAL SIZES

Federal Open-Back, Inclined Presses are available in nine sizes, with capacities ranging from six to 80 tons—either flywheel or geared type. They are the products of 40 years' experience in press building.

## Skilled Labor

An interesting and timely volume—"Breaking the Skilled Labor Bottleneck" has been issued by the National Foreman's Institute, Inc., Deep River, Conn. The author is Eugene J. Bengt, Management Engineer and the retail price is \$2.00. The book is written from practical experience and is a manual of definite procedure on how to subdivide labor skills to gain maximum production. It is intended espe-

cially for foremen, supervisors, personnel managers, job setters and vocational instructors.

An insight into the theme of the book is given by the foreword, quoting Ralph Waldo Emerson:—"That man is idle who could do something else better."

The first section of the book discusses The Nature of Skill. The scope of this is revealed by the subheads: — Musical Skill, Sensory Skills, Thinking Skills, Practical Examples, How Skill is Acquired, Analyzing Skill, and Some Training Principles.

The second section is presented under the general head of Overcoming Shortages, with a breakdown into Four Principal Ways.

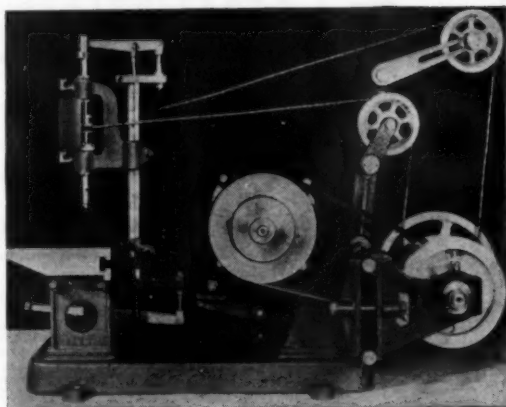
Additional discussions are given on Motivation, Supervision and Time Taken to Learn Jobs.

Full scale mobilization of industry means conversion for almost all of those not now engaged in war production — and unrelenting pressure for more production on those now turning out war goods. In either case everything depends on ability to utilize labor resources to the greatest possible advantage.



## Supersensitive High Speed Drill Press

The Edward Blake Co., 634 Commonwealth Ave., Newton Centre, Mass., announces a new Super Sensitive Drill Press for extremely small drills and other tools. The machine has a standard range of 8 speeds from 3000 to 23,000 rpm which gives the proper surface speeds on drills from .004", or smaller, to 1/16" in diameter. Sensitivity is attained by balancing the spindle by means of the vertical component of the belt tension. This sensitivity, plus convenient finger-tip control, are claimed to reduce drill breakage to a minimum.



## Silver Solder Flux

This machine was designed and developed by engineers familiar with the requirements of the watch and instrument making trades.

An improved silver solder flux for use in manufacture of tools was recently introduced by the American Products Corp., 422 South Dearborn St., Chicago, makers of welding and brazing compounds.

Machines with 1, 2, 3 and 4 spindles may be furnished. Each spindle is furnished with an independent finger-tip control and each spindle may be run at an independent speed to suit the size and type of tool being used and the material to be cut.

This new type of flux is said to be especially adapted to brazing and silver soldering cutting tool metals, such as, Ramet, Carboloy, Stellite, etc. to tool shanks, also for nickel silver and non-Ferrous metals.

Standard equipment includes 2 spindles for each spindle mount—one for Jacobs chuck, and one with tapered hole for tapered shanks.

It is a highly concentrated product and when properly diluted its cleansing properties are extremely active. Tests are said to show that parts brazed with the flux never break at the joints.

## For War Production

KARELSEN'S DIAMONDS KEEP THE WHEELS OF INDUSTRY TRUE

1/4 KT. TO 10 KT.

DIAMOND POINTED EMERY  
WHEEL DRESSERS

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# NO. 1 HEAVY DUTY GEARED HEAD HAND MILLER

Available with Longitudinal Power Feed to Table



Table: 6"x24"  
Capacity 5 1/2"x18 1/2"x18"

Geared Spindle  
Speeds — 6 forward,  
6 reverse. Optional spindle  
speed ranges available. 150-  
675 r. p. m.; 200-  
900 r. p. m.; 350-  
1350 r. p. m.

Anti-friction  
speed and spindle  
assemblies.

Built in coolant  
pump and piping.  
Motor in base.

**PROMPT  
DELIVERIES**

## ATLANTIC MACHINERY CORP.

149 BROADWAY,

NEW YORK, N. Y.

### Salvage Wardens

Two hundred salvage wardens will soon patrol the workshops of the Westinghouse Electric & Mfg. Co., hunting out scrap and promoting full use of war-vital materials. Modeled after the civilian defense units set up in every American community, the plan will operate continuously and extend to other plants of the company after being tested at East Pittsburgh works.

On each scrap hunter's left arm is a

blue, red and yellow brassard, similar to the O.C.I. insignia worn by air raid wardens. The arm band bears the legend "Salvage Warden" and the V for Victory sign.

Four workmen in each section were appointed zone wardens, each serving a full week per month. They are under the direction of district wardens who meet weekly with the chief warden. At weekly meetings, district leaders report findings of their men, review results and plan future action.

First aim of wardens is to reduce the amount of scrap. They are under orders to make every effort to find use in production for even a bit of material. A steel plate, for example, is not suitable on the job for which it was ordered, the warden checks other departments

to see if they can use it. The plate goes to the scrap pile only when it can serve no other wartime purpose.

Next they will hunt dormant scrap—old machinery that cannot be repaired, useless materials stored in out-of-the-way corners, broken or obsolete tools in drawers and on benches, etc.

Ten million pounds of scrap were collected in the last six months at the East Pittsburgh plant.

## MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S.  
NAVAL AIRCRAFT FACTORIES

### BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10' Table; Model E.L. 12' Table.

**HARVEY MFG. CORP.**

161 GRAND ST., NEW YORK

Phone Canal 6-5170

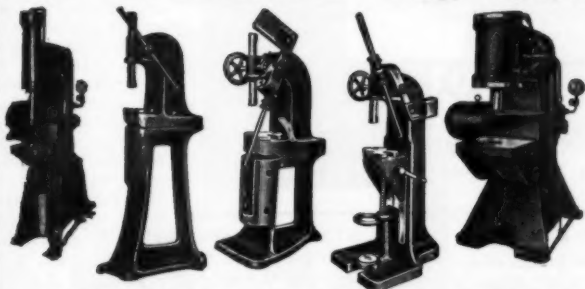


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IMITATIONS!**

Our machine  
carries the Butterfly  
trade mark.

Registered U. S. Patent Office

## For AIRCRAFT and MUNITIONS



**1883  
GREENERD**

The Originators  
of the  
Arbor Press

**1942**

### PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses  $\frac{1}{4}$  to 35 tons pressure.  
Motor driven hydraulic presses  $1\frac{1}{2}$  to 30 tons pressure.

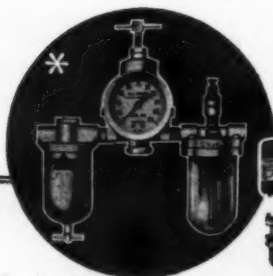
Let us send you our catalog No. F.

## GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE



## A Natural for "PROGRESSIVE"

Air is primary power for the extremely flexible PROGRESSIVE spot welders, with pressures multiplied in a booster above the gun. Air must be clean; booster thoroly lubricated.

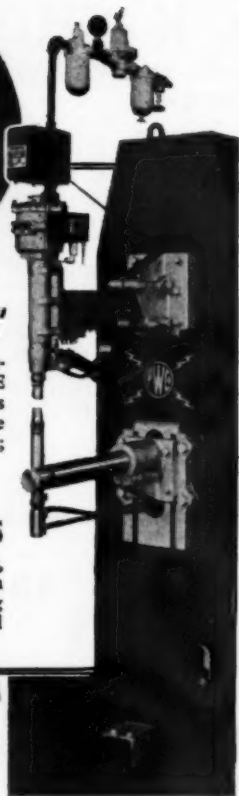
### NORGREN LUBRO-CONTROL UNITS

...filter air, regulate pressure, create a fog of oil in air stream — lubricating every working part against wear in use and against corrosion when idle.

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**C. A. NORGREN CO.**

220 Santa Fe Dr., Denver, Colo.



ing at the arbor press a steel plate of circular or rectangular type, with a number of holes bored thru it, the holes being bored just a bit larger than standard arbors that are handled around the place. It is then a simple matter to select the particular hole in the plate that is adapted for the piece of work in hand. And the work will always proceed without interruption. Such a bored plate may be hung on a post or on the wall adjacent to the arbor press, so that it will always be at hand.

Arbor presses have come in for considerable improvement in design, especially with reference to hydraulic models. Some of them incorporate fast mechanical action for the preliminary movement of the ram to the work, by spinning

### Arbor Presses

Whether you do production or odd-job work at your arbor press, it is well to check up on the processes used, to see whether they are unduly time-consuming. In too many shops, when an odd job comes along, where an arbor is to be pressed out of a thin-wall bushing, a search has to be made for some old collar or bushing that will serve to hold the thin-wall bushing while the arbor is pressed out.

All of this can be avoided, by keep-

a handwheel, after which the hydraulic cylinder takes hold of the work, and delivers the intensive pressure for the actual work.

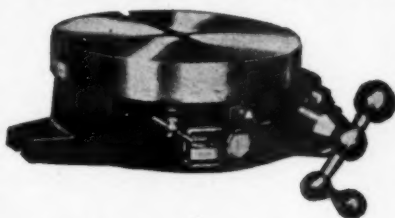
Even in the case of small bench models as made by some firms, use has been made of alloy steels to better the working parts.

The rack and gear in particular, as built by one firm, has been given special attention along this line.

# PRECISION ROTARY TABLES

Castings are high grade semi-steel nickel iron, normalized. Many shops purchase these tables to eliminate the expense of costly fixtures. Dividing attachment may be ordered after table is in use. Deliveries on most sizes reasonably quick.

*Send for literature with specifications and illustrations.*



9" — \$ 97.00  
12" — 160.00  
15" — 185.00  
18" — 220.00

**HEAVY  
DUTY**

18" — \$350.00

## ACME TOOL COMPANY

200 CHURCH ST.  
NEW YORK, N. Y.



*Shear Cut —  
High Speed*

## END MILLS

Shear Cut End Mills are offered in all standard sizes, single and double end.

*Write for catalog  
and prices today.*

**PROGRESSIVE TOOL & CUTTER CO.**  
2345 WOLCOTT ST., FERNDALE, MICHIGAN

*Rotores* GRINDER  
FOR ALL TOOLS  
PROMPT DELIVERY  
BY LARGE SCALE PRODUCTION



**DOUGLAS MACHINERY CO.**

150 BROADWAY

NEW YORK, N. Y.

### Auxiliaries

Auxiliary devices which can be used to speed various kinds of shop work are legion, and every machine shop is something of a new law unto itself as to the type of devices which can be used to best advantage in making various machines more versatile and more productive. Take the case of a good boring tool which is held by the tool-post of your lathe, and which offers quick setup changes for various types of boring and internal threading jobs.

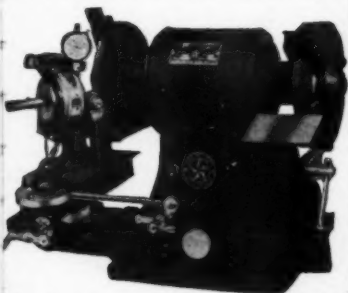
It is just what is needed for the occasional odd job of this type that comes along. Time saved on the set-up will very soon equal the cost of such a boring tool.

Tapping heads are convenient auxiliaries for one or more drill presses in a shop that has to do tapping in fairly sizable lots. Considerable advance has been made of late years in tapping swiftly and yet with safety to the taps used, even where bottom tapping must be practiced. A very sensitive double-cone, cork-faced friction clutch is provided in some of these heads. When taps become dull, the operator can detect it by the feel of the pressure necessary for driving the tap to the cut. Incidentally, standard tapping heads, as made by some firms, may also be fitted out for external threading.

Do you know that auxiliary devices are available for plain millers, by means of which end milling cutters may be employed to machine compound angles, or even to spot-face on a bevel? If you have a plain miller that is not too busy, and have intricate operations which have been a problem to perform, such an auxiliary will prove the answer.

Aids which broaden uses to which available equipment can be put, are aids, also, to America's war effort.

## Precision Drill Grinder



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect points on standard twist drills in sizes from No. 41 (.096) to  $\frac{1}{8}$ " (.625).

Send today for more details.

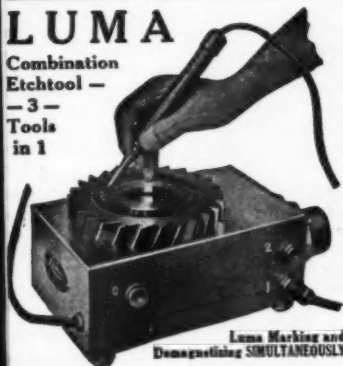
**Star Machine & Engineering Corp.**

Division Star Electric Motor Co.  
Bloomfield, - - - New Jersey

## LUMA

Combination  
Etchtool —

— 3 —  
Tools  
in 1



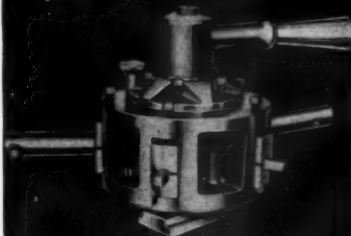
Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

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EXTREMELY RIGID CONSTRUCTION  
INTERCHANGEABLE TOOL BLOCKS  
ACCURACY, LONG LIFE GUARANTEED



Turret Head Body is of solid steel accurately machined and of ample strength to insure long life. The Index Pin of hardened steel is easily operated by lifting the knurled knob at top of Turret Body. Center Post of very heavy construction and equipped with lock nut, flatted to allow for a solid connection to the top of compound. Index Plate equipped with ten stops allowing for ten different tool settings.

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**MACHINE & TOOL CO.**  
132 CHARLES ST., AUBURNDALE, MASS.

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**STEP PULLEYS**



**SINGLE GROOVED PULLEYS**



**VARIABLE PITCH PULLEYS**



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**HAND WHEELS**



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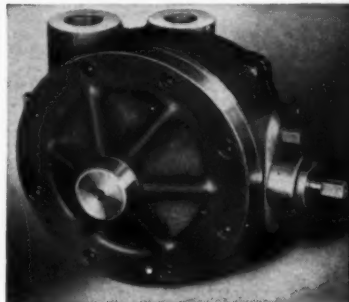
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**CHICAGO DIE CASTING MFG. CO.**  
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CATALOG ON REQUEST

## Shock-Proof Pump Has "Standard" Mounting Bracket



Heavier section reinforcing web conical instead of flat cover plate for increased resistance to shock, mounting bracket of a type that is considered "standard" by most manufacturers of hydraulic pumps, are features of the re-designed vane-type, variable delivery pump.

Originally designed and previously manufactured exclusively for use with the Duplimatic, an automatic precision type machine tool control, which requires high pressure delivery at extremely low volume, the pump is now made available as a replacement for existing pumps, or as new equipment by Hydra-Motive, Inc., 253 St. Aubin Ave., Detroit, Mich.

Adoption of this mounting, permits the pump to be used as a replacement or as original equipment, without changing current designs. Prompt shipments are possible because of stepped up production beyond the current requirements of the Duplimatic.

Delivery is infinitely variable from 0 to 4 gpm and operating pressures are 1,000 lbs. psi with a top "short-interval maximum" of 3,500 lbs. psi.

The unique method of balancing the individual vanes is an interesting feature and is exclusive with the Hydra-Motive design. Being bevelled on the edges, as well as outer (stator) side the result is said to be a marked r



duction in wear, elimination of overheating and an increase in operating efficiency.

To permit maximum selection of adjustment, a split stator instead of the conventional solid ring is employed. Adjustment and limit screws on outside of housing allow for varying delivery to any amount required within the operating range.

## BREMIL MFG. COMPANY

1700 Pitts. Ave., Erie, Pa.

ALL-ALLOY compound lever strap cutter. Cuts  $1\frac{1}{2}$  strap with one stroke.



## BURKE

### MILLING MACHINES

Make Fast Work of Small Jobs

Motor Driven

Timken roller or ball bearings to spindle



Write today for circulars.

**Burke Machine Tool Co.**  
297 E. 16th St., Conneaut, Ohio

## Fostoria Marks Milestone

Born in 1917, during World War I, now climaxing its 25th year with all-out service to war industries, an impressive 32-page booklet is offered by Fostoria Pressed Steel Corp., Fostoria, O. The firm specializes in industrial lighting, general and locational, infrared para-sphere drying — dehydrating apparatus, and coolant filters.

Generously illustrated thruout, booklet presents Fostoria's wide-spread industrial services and products with actual-use photos and an impressive list of customers.

The many pictures of practical applications of the company's apparatus to meet today's specialized demands, should be valuable to executives, everywhere.

## "KEEP 'EM ROLLING"

Buy United States War Savings Bonds and Stamps

## STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production



proof of durability. Easily installed. PRICED AT \$40. AND UP. FOR LATHES, SHAPERS, MILLERS, ETC. IMMEDIATE DELIVERY. Send for descriptive pamphlet.

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100 So. Jefferson St., Chicago, Ill.



## ON THE NEW ATLAS DIE-FILING MACHINES



Can be used for all kinds of die making. The over-arm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the over-arm. Working surface of the table, which tilts two directions, is entirely clear. An improved type chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

Price, complete with motor— **\$125.00 Net**

F. O. B. CHICAGO

### ATLAS EQUIPMENT CO.

103 S. Clinton St., Chicago, Ill.

## Linley Announces Refinements

Several important new developments are announced in connection with the Linley High Speed Vertical Milling Machine and Jig Borer, by Linley Bros. Co., 11 Montauk St., Bridgeport, Conn. In general, these refinements permit handling larger jobs, provide more clearance, furnish added rigidity and increased accuracy.

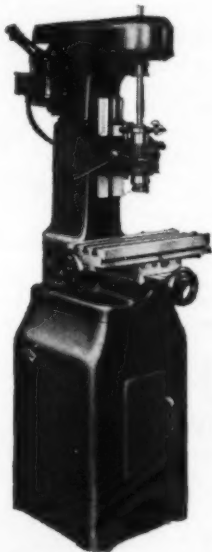


Table size has been increased to 7" x 17½", with 3 T-slots instead of 1. Longitudinal travel has been increased to 10", cross travel to 6"—both without running out of ways.

Table hand wheel is now on the left, and maximum distance from table top to spindle nose has been increased from 9" to 11½".

Column ways have been shortened at the lower end, allowing more clearance for fixtures, etc., on table. Table thickness has been increased by ½" for greater rigidity.

Movement of sliding head is 8"; quill travel 3" spindle center to column ways 5-¾"; spindle center to column

below ways 6- $\frac{3}{4}$ "; spindle speeds—275, 430, 550, 860, 1250, 2125, 2500 and 4250 rpm. Collet capacity is  $\frac{1}{2}$ "; floor to table top is 35 $\frac{1}{2}$ "; height over pulleys 62"; power is supplied by  $\frac{1}{2}$  hp motor; floor space required—18 $\frac{1}{2}$ x20" and shipping weight is 900 lbs.

Bulletins are available giving full details.

### Squeeze Riveter Catalog

Said to embody experience of more than 40 years, squeeze riveters, especially designed for all types of riveting jobs, are the topic of the attractive catalog offered on request by Hanna Engineering Wks., 1765 Elston Ave., Chicago. The book shows many of the firm's 700 styles and sizes of squeeze riveters, for hot or cold operation. Many of the machines are of hydraulic type. Made, also, by the firm are squeeze riveters to handle rivets from  $\frac{1}{8}$  to 2" diam, with reach ranging from 2 to as large as 21'. In recommending riveters to fit definite jobs, the firm's policy is to include suggestions as to dies, fixtures, work-handling and production details.

### Lyon Wood Shelving

Quickly adjustable shelving, essential for saving floor space in wartime industries but eliminated by steel priority, is now offered in wood.

The Shelving is made in open and closed types. Sections are 36" wide, 84 and 96" high, and may be had in 12, 18 or 24" depths.

Top, base, shelves, braces, arms and uprights are made of solid hard wood. Side panels, back panels on closed type are of  $\frac{1}{4}$ " plywood. It is finished with a green tinted preservative coating that reduces moisture absorption and is easy to setup.

Features of Lyon wood shelving include dividers, bin fronts, adjustable shelves, and shelf boxes.

For complete illustrations and specifications write for Lyon Bulletin No. 1705, "Lyon Products Engineered in Wood for The Duration" to Lyon Metal Products, Inc., 3042 Clark St., Aurora, Ill.



LITTELL Air-Blast Valve automatically ejects pieces from punch presses. Keeps operator's hand out of danger zone. Increases safety and speed. Air nozzle quickly adjustable.

\* Other Littell safety devices include Prox-Vac Safety Feeders for picking up and feeding flat-surfaced materials; also, air-operated Mechanical Pickers for feeding pieces that vacuum lift will not pick up.

Littell makes a complete line of Automatic Reels, Feeds, Straighteners, REQUEST BULLETINS Scrap Cutters, etc.

**F.J. LITTELL MACHINE CO.**  
4153 RAVENSWOOD AVE CHICAGO ILL.

### Geared For Victory Gear Specialists

- SPUR
- WORM
- BEVEL
- HELICAL

### The Taylor Machine Co.

1917 EAST 61st ST.,  
CLEVELAND,  
OHIO



"TAYLOR - MADE"

## QUEEN CITY GRINDERS



**Dependable • Efficient  
Economical**

Consider these facts when buying a grinder—Queen City Grinders are equipped with fully enclosed motors to protect from dust and grit. On the heavier machines, motors of 1750 R.P.M. are used which do not require large diameter wheels in order to secure the proper cutting speed at the periphery of the wheel. All grinders are equipped with carborundum wheels at no extra price. And for economy—you can't beat it. Try one of these grinders for 30 days. If you are not satisfied, return it. We can make reasonable delivery.

**QUEEN CITY MACHINE  
TOOL COMPANY**

217 EAST SECOND ST. CINCINNATI, OHIO

## Foamite Fire Engine



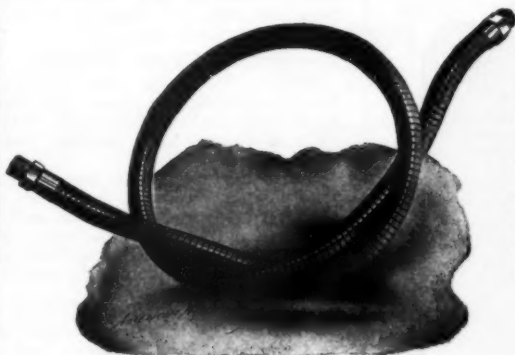
Recommended for fires in flammable liquids, alcohol storage, electrical machinery, and for other class "B" and "C" fires. A new Alfite, CO<sub>2</sub> engine is claimed by its builders, American-LaFrance-Foamite Corp., Elmira, N. Y., to be the only 100 lb CO<sub>2</sub> engine approved by Underwriters and AFM laboratories, on both oil and electrical fires.



It smothers fire instantly with carbon dioxide gas which expands upon discharge to 450 times its stored volume. It is non-corrosive, non-poisonous, odorless.

Engine is equipped with Anti - Statik horn to protect the operator from

# FLEXIBLE STEEL TUBING



The recognized standard for use on Milling Machines, Automatic Screw Machines, Turret Lathes, and other Machine Tools.

Adapted for all purposes for conveying cutting oil and other liquids. Manufactured in sizes from 1/8" to 1/2" inside diameters.

Write for  
bulletin No. 637

**T. R. ALMOND MFG. CO.**

**ASHBURNHAM,  
MASS.**

## ALCO FOR ALL AUTOMATIC SCREW MACHINES



**ALCO  
ACORN TYPE  
DIE HOLDER**

Modern production demands call for modern equipment. ALCO Die Holders are standard equipment on most modern machines and a must on old machines—brings them up-to-date and makes them produce accurate work.

Stop those taper threads—Stop those torn threads—Cut perfect threads all ways.

Equip with Alco Acorn Type Die Holders.

### ALCO TOOLS

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**THE ALCO TOOL COMPANY**  
252 BIRDSEYE STREET, BRIDGEPORT, CONN.  
DETROIT OFFICE: 108 STEPHENSON BLDG.

## ROGERS REAMERS

SINCE 1885



Conserve High Speed Steel by using  
Rogers inserted Blade adjustable-  
for-wear Reamers

**JOHN M. ROGERS TOOL CORP.**  
GLOUCESTER CITY NEW JERSEY

static charge, according to the manufacturer. It is designed for perfect balance at wheeling height, has a third swivel wheel for easy maneuvering, and a retaining latch which releases horn instantly, yet holds it firmly in place when not in use.

### Hypro Planer Bulletin

Bulletin No. 175, by Cincinnati Planer Co., Cincinnati, O., covers the firm's Hypro Vertical Boring and Turning Mills as thoroly as a personal inspection.

Sturdiness, adaptability and operating flexibility are claimed for these machines, combined for fast and accurate work. Featured are spiral bevel table, completely Timkenized speedbox, with railhead saddles mounted in anti-friction roller bearings.

The massive 8'-10'-12' and 12'-16' extension type machines are shown with sectionalized, close-up views and descriptions which leave no detail uncovered. Cut-away views clearly explain features of drive, feed, traverse and other actuated parts, while complete specifications and data are given in the latter pages. The book contains 20 pages and is file-sized, for handy reference.

### Motion Picture Lessons in Grinding

Ever since the training of apprentices in war-work plants became a problem, there has been a demand for practical information on grinding methods. To meet that demand, the Norton Co., Worcester, Mass., has produced a new series of motion pictures entitled—"Lessons in Grinding."

These apprentice training films are now ready for distribution and are available to industrial apprentice schools, army and navy training schools, and other classes where machine shop practice is being taught in colleges, universities and vocational schools. The films are intended to present merely the fundamentals of grinding in a way that the inexperienced man can understand.

A new handsomely illustrated 6-page bulletin gives complete information regarding the film and how to obtain it.

# A CLAMP for Every Purpose



Forged Steel  
Quick Acting  
Deep Reach  
Welders



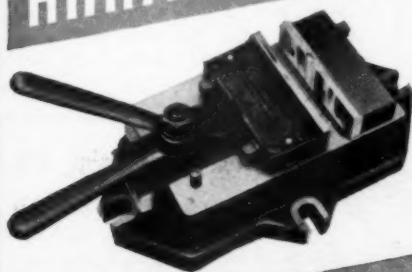
Sizes Available:  
 $\frac{3}{4}$ " to 10' opening  
 $\frac{1}{2}$ " to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes  
as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE.,  
CINCINNATI, OHIO

## THE HARTFORD *Four point* MILLING VISE



The Vise with the one piece solid forged movable jaw

**STRENGTH**  
**POWER**  
**ACCURACY**  
**SPEED**

This time tested "Four-Point" Milling Vise has performed most successfully for a number of years in large manufacturing plants producing interchangeable parts. It is designed and constructed to take the present day feeds and speeds of modern milling machines... It is particularly adaptable to small arms milling. Production milling work today cannot afford the time and cost of a slow operating vise. Speed is essential, in fact vital. Write for further and more detailed description.

**THE HARTFORD SPECIAL MACHINERY CO.**

HARTFORD - CONNECTICUT.



## "CHAMPION" Steel Racks

Save time, steps and money  
by keeping bar stock, shafting  
and pipe out of the way and  
off the floor.

*Write for full details.*

**The Western  
Tool & Mfg. Co.**  
Springfield, Ohio

## EKLIND

UNIVERSAL  
MILLING HEAD

**CAN BE  
ADAPTED  
TO ANY  
MACHINE**

**MILLS  
DRILLS  
BORES**

**at any  
angle**

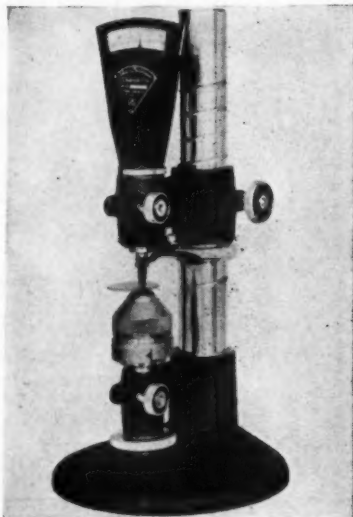
**Speeds  
from  
250-4000**

*Write  
for  
Circular*



**UNIVERSAL HIGH SPEED TOOL CO.**  
551 W. Washington Blvd. Chicago, Ill.

## Measuring Thin Work



A new ball measuring anvil for use  
on the Scherr Comparitol is designed  
to speed up measurement of thin work.  
It is claimed that with this new equip-  
ment, inspection and measuring of ex-  
tremely thin pieces, such as crystals,  
laminations, shims, extremely small  
gages and other flat work can be ac-  
complished easily, rapidly and with  
accurate results.

**GROBET  
ROTARY FILES**  
ground from the solid



## Ask for Catalog WG

the most complete catalog  
of its kind, illustrating hun-  
dreds of rotary files hand cut,  
milled cut, ground from the solid;  
also diesinkers' burs.

**GROBET FILE CO. OF AMERICA** 3 Park Pl., New York, N. Y.



The extreme thinness of this class of work makes it difficult, impractical and frequently impossible to obtain accurate reading in .0001" or .00005" by the use of the standard flat or serrated measuring anvil.

It is explained that with the ball anvil, work is placed between the flat feeler point and the round ball surface and absolutely dependable results are obtained regardless of which part of the thin piece under inspection is being measured. Danger of distorting or bending the shim or lamination out of size a few ten - thousandths due to measuring pressure of the instrument is said to be eliminated by the use of the measuring ball anvil.

The instrument may also be used to check the flatness or parallelism of long thin pieces in all positions and on all parts of the work. The Comparitol column when used with this ball anvil is provided with an index line so that the ball point and feeler point can be lined up accurately from left to right as to center distance.

This new development is said to have solved a number of very difficult measuring problems involving uses of extremely thin pieces. Full information may be obtained from the George Scherr Co. Inc., 122 Lafayette St., New York, N. Y.

**"Keep 'em Flying"**  
Buy U. S. War Savings Bonds  
and Stamps



## Artus Spacers

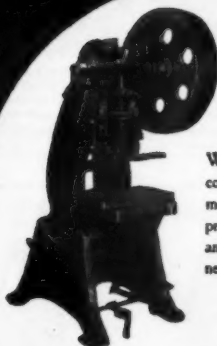
Made of Synthetic Resin in thicknesses from .001" — .020". Each thickness can be identified by its color.

### IMMEDIATE DELIVERY

Send for detailed circular and price list.

**Industrial Products Suppliers,**  
2 Broadway, New York City

## RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for  
bulletins.

**ZEH & HAHNEMANN CO.**  
Newark, New Jersey

**5000  
SHAPES AND SIZES  
GROBET Swiss Files**



## Ask for Catalog WF.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

**GROBET FILE CO. OF AMERICA 3 Park Pl., New York, N. Y.**

### Improve Air-Chucking

Drill presses, lathes and vertical milling machines are easily and quickly converted into production machines, by use of air cylinders and air-operated chucking devices, newly announced by Anker-Holth Mfg. Co., 332 S. Michigan Ave., Chicago.

Illustrated is a drill press equipped with the new air cylinder and air-operated, 3-jaw universal chuck, used for performing all internal machining

operations on 40 mm, M48 high explosive shells.

These combinations are now made by the firm in sizes from 37 mm thru 105 mm, for immediate delivery, according to the firm, whose facilities have been greatly expanded, to take care of war-production demand.

Available, also, is its bulletin on Airgrip, air-operated chucking devices.

### Flexible Shaft Apparatus

Wyzenbeek & Staff, 838 W. Hubbard St., Chicago, makers of Wyco flexible shaft machines, announces ability to make immediate delivery on high-priority orders. Special feature claimed for the product, is a non-metallic shaft inner-liner, said to afford protection to core, smoother, cooler running, reduced friction and longer life. All units are standardized with parts interchangeable.

Information as to territories available, may be had by writing to the firm.

### THE SIMPLIFIED PYRO OPTICAL PYROMETER



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

**THE PYROMETER INSTRUMENT CO.**  
102-105 Lafayette St., New York, N. Y.



### Speed Up Your Riveting Operations

A great help in War Production, these Grant Riveters are available in Noiseless Spinning and Vibrating Hammer types, also Vertical and Horizontal Multiple Spindle Spinning Machines. Information? Write!

**THE GRANT MFG. & MACHINE CO.**  
C. E. Station, Bridgeport, Conn.



### PADDOCK Ball Bearing BANDSAW GUIDES

Reduce Blade  
Breakage  
Increase  
Production

Easily adjusted to all sizes of blades to 1½" wide.

Recommended for new and old machines running at any speed cutting all materials.

**Shipped on 10 day approval**

**PADDOCK TOOL CO.**  
1418 Walnut St., Kansas City, Mo.

## Knurl-Selector Slide Rule

To speed up delivery of knurls that are most widely used for ordinary knurling operations, a new Slide Rule type Selector Table described as a table of "Recommended Emergency Styles of Reed Standard Stock Knurls" has been devised. It utilizes the slide rule principle to simplify selections of knurls according to size, pitch and pattern produced, with the catalog number of each knurl shown for ease in order-

ing. The table is a condensed listing of the company's complete line of knurls, designating the styles in greatest demand as "emergency styles", with a recommendation that these styles be used wherever possible in the interest of better deliveries during the emergency.

Included also is a Table of Average Increase in Outside Diameter for Representative Knurl Patterns, Pitches and Tooth Angles. This information serves as a guide to the engineer or machine operator by providing a simple method of determining how much the diameter of a part is increased by various styles of popular knurls.

As each knurl in the Selector Table is designated by a specific catalog number symbolizing size, pattern and pitch, the mechanics of ordering are greatly simplified. Copies are available to purchasing agents, superintendents, foremen, engineers, set-up men and operators in plants where knurling tools are used by writing to Reed Small Tool Works, Dept. M T, Worcester, Mass.



### MOTOR MICA

REG. U.S. PAT. OFF.

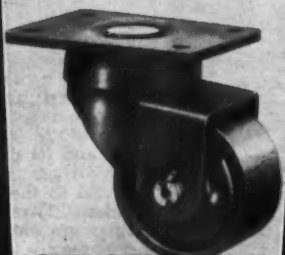
**ANTI-FRICTION COMPOUND**  
Motor-Mica will solve your toughest lubricating problems. Prevents metal to metal contact. Cools HOT BEARINGS. Speeds up Stamping, Turning, Drilling, Milling, Threading, Boring, Tapping, Die-Casting, Screw Machine and other operations.

Packed in  
1-5-10-25-50 lb.  
Containers

Write for free sample today!

**SCIENTIFIC LUBRICANTS COMPANY**  
Dept. H., 3462 N. Clark St., Chicago, Ill.

## DARNELL



## CASTERS

Write for NEW  
DARNELL MANUAL

**DARNELL CORP. LTD.**, 60 WALDEN ST., NEW YORK, N. Y.  
LONG BEACH, CALIFORNIA, 36 N. CLINTON, CHICAGO, ILL.

## FELL PRECISION LEVEL



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes— $5\frac{1}{2}" \times 12"$ ;  $3\frac{1}{2}" \times 6"$ .

Write TODAY for  
bulletin giving full details.

**Wm. B. FELL COMPANY**  
700 South St. Rockford, Ill.

## Cuts Cams with One Set-Up

### Case History No. 7

The shaping of feed cams is a problem that is easily solved with a **SLOTMASTER**. The cam blank is chucked in a Dividing Head on a milling machine. The rise on the cam is then readily calculated between the Dividing Head Index and the Micrometer Dial on the milling machine Feed Screw. In this way a perfectly true and uniform cam rise is obtained. Only one set-up is required and the time for calculation is negligible. Any other method, such as might be accomplished on a standard milling machine or shaper would require numerous time consuming set-ups.

Thomson Illustrates set-up.

**SLOTMASTER** can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other. The stroke of the ram is adjustable from 0 to 4" .. the speeds range from 50 to 250 s.p.m. The tool holder of the clapper box type, can be turned in any position. All of the working parts are of tool steel heat treated and ground to close tolerances. **SLOTMASTER** comes complete with pulleys, motor, belt and mounting adaptable to round over-arm or flat-on-round-overarm milling machines.

*Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.*

### EXPERIMENTAL TOOL & DIE COMPANY

12607 Greiner

Detroit, Mich.



Conventional set-up on round over-arm milling machine.

### Radial Arms

There are a great many cases and places in machine design where radial arms may be used to advantage. But, as a general rule, when we hear the radial arm mentioned, we naturally think first of a radial drill. Even when we come to limit ourselves to the thought of radial drills, we are still

confronted with quite a bit of variety in design, as practiced by different drill builders.

Methods of clamping the radial arm to the drill column are interesting. In one case, a special slow-speed torque motor was employed for operating the arm clamp of a radial drill. The clamp on the drill was made self-locking, so that the power supply to the motor could be shut off when the arm was clamped. Releasing of the clamp is simply a matter of reversing the motor.

In a certain radial drill, having two clamping rings in the radial arm barrel, a hydraulic cylinder is employed for locking the barrel to the column. The job is accomplished by the spreading action of the cylinder and its piston, when oil is admitted to the cylinder. The two rings are actuated by toggles. The

cylinder proper is fastened to one toggle on the lower clamping ring, and the piston is attached to the other toggle, for operating the top clamping ring. Thus, the pressure has an outlet equally in the two directions for operating the two rings.

Some radial arms are of the universal type, swinging on their axes.

*Hammond*  
OF KALAMAZOO

## NEW 20" WHEEL WET TOOL GRINDER

FOR LARGER  
CARBIDE AND  
OTHER TOOLS

*New  
outstanding  
features!*



Tilting table for carbide tool grinding (optional)

New improved combination tool rest and wheel dresser. Tilting table for carbide tool grinding (optional). Circulating coolant system features sliding and tilting deflector. Large sludge pan 24" wide x 35½" long, 8" deep has removable splash guard (shown in phantom) adds protection, aids cleaning.

WRITE FOR BULLETIN 101

*Hammond Machinery Builders* INC.



1614 DOUGLAS AVENUE



KALAMAZOO • MICHIGAN

Eastern Branch—71 West 23rd Street, New York, N. Y.

### Backlash

More or less continual attention being given to backlash elimination, both by machine designers and operators, has brought the time when we do not have as much trouble along this line as formerly. But there is still ground to be taken. In hydraulic feeds, as applied to automatic lathes and other machines working at high speed, where constant and uniform pressure between tools and work is important, you will find that particular engineers and de-

signers very often employ the closed-circuit type of hydraulic operation, designed to eliminate backlash. On one automatic lathe built for turning, facing and chamfering some very tough ring-shaped forgings, this closed-circuit hydraulic feed was used to very high advantage.

Whenever and wherever a constant one-direction thrust can consistently be maintained, backlash is eliminated. This being true, some machine designers have capitalized on gravity to maintain such a thrust, by incorporating sufficient weight in a member and mounting it for vertical travel. Thus, there is a continual and an ample downward thrust. In the case of a single spindle hobbing machine noticed, this principle was used. A heavy work slide was provided to advance the work to the cutter vertically, and backlash was entirely eliminated.

In one instance, namely that of an outstanding threading machine, backlash in the leadscrew was eliminated by use of a 3d half-nut operating on the screw, and made adjustable. This nut may be set to bear against one side of the leadscrew threading, and the regular split nut bearing against the other side of the threads, eliminates all lost motion and backlash.

**EDITORIAL NOTE:** Machines referred to will be identified on request.

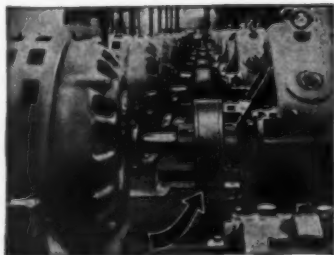
# USE KANTI-LEVER COUPLINGS

## THEY HELP YOU Maintain Peak Production

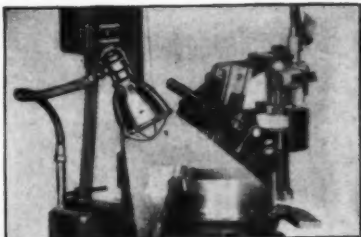
With your machines now forced to the limit to gain peak output, the necessity of stopping for repairs becomes much greater. You can prevent many of these costly interruptions of production by using KANTI-LEVER Couplings, for they have a scientifically designed Cushion Torque that absorbs sudden load shock and torsional vibration -- the two main causes of wear, fatigue and failure of machinery. The KANTI-LEVER is different from any other type and gives your machinery a protection that is vitally needed under present abnormal conditions. See cut showing 70 KANTI-LEVERS that have proved invaluable to their user by protecting the driven machines and enabling steady production for over 18 years.

Send for Bulletin 28-B describing

**Kanti-lever Couplings**



**BROWN**  
ENGINEERING CO. 126 N. THIRD ST.  
READING, PA.



## MAXIMUM LIGHTING EFFICIENCY . .

when you combine Vimcolight directly on the work with fluorescent lighting overhead. Makes work safer . . . lessens eye fatigue . . . reduces spoilage. Hundreds of America's finest machine tools are VIMCOLIGHTED.

Are yours?

## VIMCOLIGHT

VIMCO MANUFACTURING CO.  
109 CHENANGO ST. BUFFALO, N. Y.

## THE HOTEL PREFERRED HOTEL METROPOLE

A stopping place modern in every detail, yet maintaining a friendly atmosphere and hearty hospitality. Preferred by experienced travelers. 3-Dining Rooms. Garage. Rooms from \$1.75. With bath from \$2.50.

**CINCINNATI, OHIO**

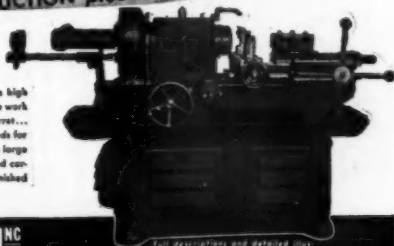
# The MOREY 2G Back-Geared TURRET LATHE

Timken Bearing  
Self-Locking Turret—Infinite Spindle Speeds

Features HIGH SPEED PRODUCTION plus OPERATING ECONOMY

The MOREY 2G Timken Bearing Turret Lathe increases today's high speed production with a minimum of operating expense. More work at less cost with these money saving features: Self-Locking Turret... Vibrationless precision with an infinite variety of spindle speeds for every job... Back Gears instantly thrown in through extra large Twin Disc Clutch... takes full advantage of high speed and con-  
cave tools. Modern design for modern production. Can be furnished with tooling.

**CAPACITY**  
Automatic Chuck (round) 1"  
Swing over cross slide 6"  
Swing over bed 14"



**MOREY MACHINERY CO., INC.**

410 MADAME STREET • NEW YORK, N. Y.

Full descriptions and detailed drawings are shown in Circular 329. Ask for it TODAY!

## SIMPLIFIED INTERNAL GRINDING the with MAJESTIC INTERNAL GRINDER



An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

### SPECIFICATIONS

Length of table, 48". Swing over table, 10". Travel of cross slide, 2½". Precision dial graduated to .0001". Precision bearing work head. Speeds—100, 225, 350 r.p.m.

Write for complete details contained in New Bulletin

**Majestic Tool & Mfg. Co.**  
2948 E. Woodbridge Detroit, Mich.



# SENSATION IN '32 SALVATION IN '42



Victor Saw Works, Inc. advertisement on front cover of "American Machinist" for February 4, 1932.

Ten years ago, the first molybdenum alloy back saw blade—introduced by VICTOR—was the sensation of the metal cutting industry, bringing tungsten high speed steel performance at half the cost.

Today, the molybdenum alloy blade is the salvation of the metal cutting industry, for today's VICTOR "Moly" High Speed—ahead in steel analysis and heat treatment—is maintaining and accelerating production schedules for those accustomed to the use of other high speed steel blades.

Whenever you buy molybdenum alloy blades, be sure you get the original, genuine VICTOR "Moly" High Speed, easy to identify by its all-over gold metallic finish.



**VICTOR SAW WORKS, INC.**  
MIDDLETOWN, NEW YORK



To speed work and save blades give your men this fact-packed 10-page booklet on selection, use and care of back saw blades and frames. Get it free from your supplier or write direct.

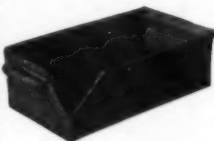
"T. M. Reg.—Blades bearing the name "Moly" are made only by Victor Saw Works, Inc. and affiliated companies.

3184

## Steel Shop Equipment

Many handy items of shop equipment are made by The Cleveland Wire Spring Co., Steel Factory Equipment Div., whose new modern factory is located at 5250 Brookpark Road, Cleveland, O.

Two of these items are illustrated, viz., Piling Boxes for Small Pieces and the Steel Bench Legs. The boxes shown



are especially designed for the expeditious handling of small pieces, permitting easy and complete dumping. The boxes are made in any size required. The cutout corner reveals the unusual construction. Many other types of boxes are illustrated in this firm's catalog.



Bench legs are offered for every size and style of bench. The type shown is for single benches, and may be used against the wall or away from it. No castings are employed in this design. The legs are

built of sturdy, rigid, heavy angle steel (of a size suitable for the duty intended) and braced for maximum stability. Holes in top rails are for 12" planks unless otherwise ordered. Top leg extends 6" where legs are to be used on wall benches. Standard size is 31" high x 30" wide overall. They are made in other sizes to suit requirements. Legs are also available for double benches, where it is desirable to work on both sides. Steel bench drawers of single type or covered are also included in the extensive Cleveland line. In fact, the expanded new factory is fully equipped to provide almost any item of steel shop equipment that might be required in war production work.



# ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

Chicago Office:  
6422 N. RICHMOND STREET

New York Office:  
170 BROADWAY

Boston Office:  
830 OLD SOUTH BLDG.

## CLUTCH OR CONE DRIVE

*Our High Speed Tappers  
are Super-Sensitive for  
Small Tapping*



*Style D-E, Quick Change Tools*

MODEL 25



## MARK YOUR PARTS

*Permanently*

PART NUMBERS  
HEAT NUMBERS,

CATALOG NUMBERS,  
SERIAL NUMBERS,

PATENT NUMBERS

MANUFACTURER—INSTRUCTION DATA—INSPECTION

Positive, Permanent marking on your products assist prospects to order. Makes it easier to buy—new, repeats and repairs. Gives you a definite record of pertinent data on each part produced.

The Pneumatic marking machine illustrated is our HI-DUTY model 25 general purpose tool for short runs or production work. It operates from your shop air line and is one of numerous models built to produce neat, permanent markings quickly on metal fabrications.

We will be happy to make specific recommendations upon receipt of samples or prints of parts to be marked, showing approximate lettering, its location on the part, with required hourly production.

### MARKED PARTS ADVERTISE

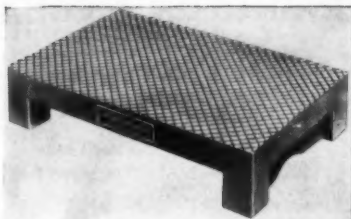
IN THE RIGHT PLACE, AT THE RIGHT TIME.

*Send for complete catalog of our full line  
of marking Tools, Machinery and Equipment.*

**GEO. T. SCHMIDT, Inc.**  
1802 Belle Plaine Ave., Chicago, Ill.

## American Precision Lapping Plate

An improved lapping plate said to have superior features, designed by practical tool makers, has been announced by American Gauge Co., 126 Bayard Street, Dayton, O. It is 8" wide by 12½" long and 2½" high, convenient size to place on the tool maker's bench where it is at all times handy.



### PROMPT DELIVERY

#### PRECISION GROUND THREAD PLUG GAUGES

- Single End Plugs
- Double End Plugs
- Combination thread plug and plain plug for minor diameters

ANY SIZE TO ORDER

**MARYLAND MACHINE COMPANY**  
5213 Reisterstown Rd., Baltimore, Md.

### VERTICAL MILL and AG BORER

A simplified, precision tool for milling, boring, facing and routing small parts for instruments and arms, munitions, etc.

Spindle dia. at driving end, ¾", 1150 and 1750 r.p.m., 5 Speeds. 12" longitudinal travel of table, 7" cross travel, 4" Spindle feed.

WRITE FOR FOLDER

AG & S Representative  
in all principal cities.



**GRANITE STATE MACHINERY CO.**  
MANCHESTER INC., NEW HAMPSHIRE

Exclusive Agents  
**H. LEACH MACHINERY CO., Providence, R. I.**

The block is of especially fine grain cast iron, about 1½" thick, and mounted on 4 legs. Surface is cut with 1/16" grooves in a diamond pattern, grooves being spaced ¼" and at right angles to each other, but 45° to the length and breadth of the plate. This is said to give them superior cutting action when the object is lapped on the plate.

Lapping plate surface is first ground and then lapped until it is accurately flat and the grooves are cut deep so that surplus lapping compound will not accumulate on surface of plate.

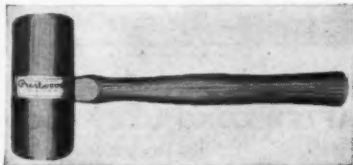
It is very easy to recondition plates by lapping one against another. This lapping plate is especially designed for all types of gauges and surfaces requiring tolerances. Prompt deliveries, based on reasonable preference ratings, are available, according to the manufacturers.

### Toggle Clamp Treatise

Detroit Stamping Co., 347 Midland Ave., Detroit, announces release of Bulletin No. 42, containing an exhaustive parade of its line of De-Sta-Co Toggle Clamps for use in designing fixtures for welding, drilling, machining, reaming, inspection, assembly and other production operations. In 10 file-sized pages are many illustrations showing wide range of clamps and applications in as great a range of operations. Horizontal, low-height clamps, recommended for use where overhead clearance is wanted in tapping, routing and end mill operations, are given in detailed drawings.

Other products, stampings, blower-fan housings, special washers, arbor spacers, etc., are also illustrated.

## Brewer Prestwood Mallets



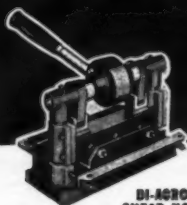
With the growing scarcity of materials customarily used in making mallets and hammers, yet with the increasing need of such important tools thru-out industry, comes the announcement from Brewer Electric Mfg. Co., 5118 N. Ravenswood Ave., Chicago, that they have a mallet which can be produced in any quantity and is available without priority on short notice.

It is the revolutionary idea of taking

wood that is already very hard and making it much harder by using a new patented chemical and compression process, thus multiplying the hardness and durability of their line of Tornado Prestwood Mallets, newly added to their line of portable blowers, cleaners, etchers, etc.

Made of wood, chemically treated and reduced in size under extreme pressure, Tornado Prestwood Mallets, are claimed to be the answer to the problem of procuring mallets of suitable hardness, texture, size, weight and durability, for doing all types of driving, straightening and hammering jobs, ordinarily done with other types of hammers and mallets that come under the priority rating system. These mallets are said to be non-splintering and are refaceable, thus making them long-lived and useful over a long period of time. They are made in 3 sizes and weights.

# FORMING *without* DIES!



**DI-ACRO  
SHEAR NO. 1**

Trims duplicated stampings, shears stock sheets, cuts strips, squares up stampings, makes slots or notches. Shearing width 6".

### DI-ACRO BRAKE NO. 1 (RIGHT)

Creates non-stock sized angles, channels, Vees, etc. Folding width 12". Right or left-hand operation. DI-ACRO BRAKE NO. 1, smaller size, shearing width 6".



● You can form or duplicate many metal parts to die accuracy and save time and die costs with "DI-ACRO" Precision Machines—Bender, Shear, Brake. As well as being used for short runs, experimental and research work, in many cases DI-ACRO machines are proving profitable for production line work in multiple units. All duplicated work is accurate to .001".



**DI-ACRO  
BENDER  
NO. 1**

Forms intricate shapes from Angles — Channels — Rod — Round or Square Tube — Round, Half-Round, Square or Flat Wire — Strip Stock. TWO-WAY operation.

### Get New Catalog "METAL DUPLICATING WITHOUT DIES"

It describes the DI-ACRO System of "Metal Duplicating Without Dies" and shows many cost-cutting, time-saving applications in making small parts or pieces. Send for it today.



**O'NEIL-IRWIN MFG. CO., 314-8th Ave. S. MINNEAPOLIS, MINN.**

## Fire Bombs

Military authorities have warned repeatedly that we must be prepared to defend ourselves against air attack. Logical aim of war from the skies is disruption of civilian and industrial life with consequent damage to production and morale. The weapon which it is expected will be used most of all is the fire bomb.

First step in preparing against such attack is a thorough check-up of fire fighting equipment now in place. Alarm, sprinkler systems and fire extinguishers are false promises of security unless they are ready for instant use when danger strikes. Reports of sabotage of extinguishers emphasize importance of regular check-ups.

Establishments equipped with approved extinguishers can supplement them with buckets of sand and long-handled shovels. These are the common and safe weapons for fighting light magnesium incendiary bombs effectively, as demonstrated in "Fighting the Fire Bomb," training film approved by OCD.

There are 2 phases to the burning magnesium bomb. The first is violent

burning of the thermit igniting charge within the bomb, when melted metal and flames spurt for several feet. During this eruption, which lasts for about a minute, no attempt should be made to approach the bomb. It is important to watch and wait at a safe distance, since the bomb may contain an explosive charge which will go off during the thermit reaction which ignites the magnesium.



## Are Your Plug Gages Accurate AFTER LONG USE?



ORIGINATORS  
and Exclusive  
mfrs. of DUBLIFE  
GAGES and UPPCO  
FINISH

## Plug Gages That Last Twice As Long!

DUBLIFE PLUGS are reversible. When one end of "Go" and "No-Go" Plug is worn from wear, change is quickly made by reversing worn plug. Bronze tapered collet in hexagonal handle, securely locks plug as driven in. Reversal means twice the service! Always specify UPPCO finished for longest life.

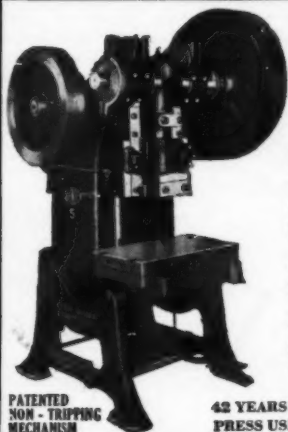
Sizes: .030 to 1".

Send for Complete Catalog of DUBLIFE and other Gages of American Gage design. Specify DUBLIFE Gages and UPPCO finish. Write.



## United Precision Products Co.

3522 W. Belmont Ave., Chicago, Ill.



PATENTED  
NON - TRIPPING  
MECHANISM

## UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.

*With Modern*



42 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD.

**JOHNSON MACHINE AND PRESS CORP., ELKHART, INDIANA**

**An AIR GUN that won't leak  
or get out of order—  
one that Operators like**

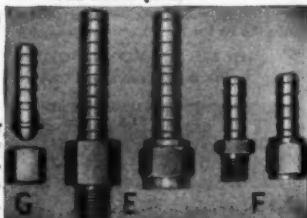


Air-O-Chek Air Guns are LEAKPROOF. They make it easier to keep press-up, save power, avoid compressor wear, and reduce maintenance. Made in many types and sizes to meet all requirements. Write for Bulletin.

Only AIR-O-CHEK Air Guns give the positive, leakproof operation that maintenance men dream about.

No packing glands to leak or be adjusted.  
No protruding levers or buttons.

The only Air Gun with totally enclosed lever that actuates the valve thru a ball and socket joint.



Fittings for air and welding hose.

**AIR-WAY PUMP & EQUIPMENT CO., 401 S. Jefferson St., Chicago**

## The ANGLE COMPUTER

*A time-saving, labor-saving instrument designed to simplify the layout of die work!*



Three individual directions of rotation.

Locates to 1/1000th of inch!

For machined parts, for castings in survey stage, for finished precision parts ready for inspection. Part is clamped to surface plates—every angle or compound angle can be checked. Accurate, guaranteed. Write for complete information.

### The ANGLE COMPUTER CO.

5729 Melrose Avenue,

Hollywood, California

## TO HELP YOU TEACH THE NEW GRINDER HAND



how to get maximum service from your Diamond Tools—we have some effective training material. Send for it. No obligation.

KOEBEL DIAMOND TOOL CO.  
9352 Grinnell Ave., Detroit

## KOEBELITE DIAMOND TOOLS

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for All Industrial Purposes.

## "Dill Berries" Roll Off

Said to be a new improved method of treating cover glass for welders, has been developed by the Carter-Lockard Co., 225 W. 11th St., Los Angeles.



A cover glass called Klearsite has been developed, said to stay clear for over 100 hours welding time, repelling the sparks and molten metal with which it comes in contact. "Dill berries", which stick to ordinary glass, slide off of Klearsite, it is said.

It is easily identified by its black opaque border. Samples are available from the company.

## Senacon Air Motor Bulletins

Smith-Johnson Corp., 623 East 12th St., Los Angeles, offers a new bulletin describing the construction and uses of Senacon Air Motors. These motors are finding wide application for the provision of auxiliary reciprocating fractional horsepower for drill presses, milling machines, and other manually operated small machine tools.

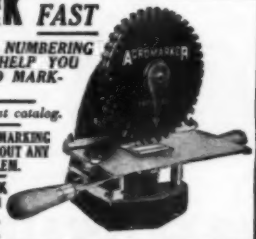
## ACROMARK FAST

MARKING & NUMBERING MACHINES HELP YOU DO A GOOD MARKING JOB.

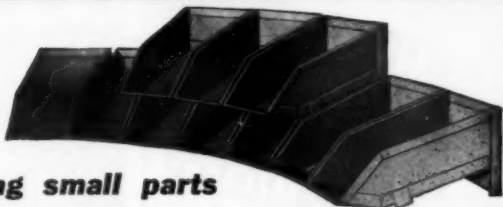
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CONSULT OUR MARKING SPECIALISTS ABOUT ANY MARKING PROBLEM.

THE ACROMARK CORPORATION  
815 Market St.  
Elizabeth, N. J.



# NEW BINS



## for assembling small parts

Floors slope to feed parts to front — end reaching and fumbling.

All-welded construction. Rolled, smooth edges.

Bins taper toward front to form convenient semi-circle — keep all bins within easy reach.

Nesting, locking construction for rigid set-ups, easily changed when necessary.

Two sizes — tapered or straight edges. Hoppers available for steady work.

Write Stackbin Corporation, 55 Troy St., Providence, R. I., for further details and low prices.

# STACKBIN



# SYSTEM

"Stacked and

Still Accessible"

STACKBIN CORP., Providence, R. I.

## EFFICIENCY — SPEED — ACCURACY ARE ASSURED WITH OLIVER DIE MAKING MACHINES



Model  
S-1

\* \* \* \* \*

You can speed output on Dies  
— Gages — Cams — Templates —  
Experimental Work —  
You can use less skilled operators.

\* \* \* \* \*

We also build:  
Drill Grinders —  
Cutter Grinders —  
Face Mill Grinders —  
Tool Bit Grinders

Large Savings — Small Investment.

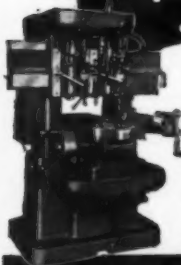
Send for Bulletin Today.

**OLIVER INSTRUMENT CO.,** 1408 Maumee Street, East,  
Adrian, Michigan



Preloaded Precision Bearings for Spindles

# MOREY 12M HIGH-SPEED VERTICAL PROFILER and MILLER



Two spindle or single spindle

Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

**MOREY MACHINERY CO., INC.**  
410 Broome Street New York, N. Y.



## SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied  $15\frac{1}{2}^\circ$  by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send **TODAY** for illustrated catalog No. 2.

**MIDWEST TOOL & ENG. CO.**  
112 Webster St., Dayton, Ohio

## One-Man Conservation Crew



Possessed of considerably above average "tinkering" ability, this member of the plant maintenance force at Monarch Machine Tool Co., Sidney, Ohio, has been making a regular practice of gathering odds and ends of discarded materials around the plant and converting them into such useful objects as the shelves and cabinets shown here.

General housekeeping in the plant has been immeasurably improved as a result of having additional storage facilities such as are provided by this type of "reclamation" effort. Materials which otherwise would find their way to the dump are put back into immediately useful service.

## Crucible Steel Bulletins

Crucible Steel Co. of America, 405 Lexington Ave., New York, offers 4 new folders on: Rexalloy Tipped Tools, Drill Rod, Rex MM and MMM Molybdenum High Speed Steels, with data on recommended service, approximate analyses, hardness, forging, annealing and tempering.

The folders on drill rod and tipped tools also give complete data.



# WILLEY'S

## STANDARD CARBIDE TOOLS

You can handle 90% of your requirements with Willey's General Purpose Tungsten Carbide Tools, which are suitable for machining cast iron, tough hard rubber, bakelite, fibre and tough alloy steels.

Willey's General Purpose Tools give you low prices, increased production and lower operating costs. **Prompt deliveries** on these standard tools.

**NEW CATALOG JUST OUT.  
WRITE TODAY!**



### WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway.

Detroit, Michigan

# COLBORNE

## Speed Lathes



**SPEED-UP FINAL OPERATIONS  
ON DIES, GEARS, SCREWS  
LONG RODS, SHAFTS**

For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc.

Built to meet the requirements of those desiring a heavily constructed, smooth running machine of highest quality.

Has one H.P. built in motor with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown.

Collets or chuck may be used.

**GOOD DELIVERY**

*Write today for details*

Machinery builders since 1879.

## COLBORNE MFG. COMPANY

157 W. DIVISION ST., CHICAGO, ILL.

## THE PRECISION UNIVERSAL TOOL HEAD

ADJUSTABLE  
While Running



Absolutely Different

brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Horizontal Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletins. Address all communications, inquiries and orders to

THE PRECISION TOOL COMPANY  
P. O. BOX 155, BROOKLYN, NEW YORK

Cable Address: "Precision-New York" Tel: MAin 4-1064



## RED HEAD

### ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Midget Chucks.

Send TODAY for latest circulars

### PRINTZ ELECTRIC CO.

14595 KENTUCKY AVE.,  
DETROIT, MICHIGAN

## THE WONDER CUTTER

Cuts wire or rod up to  $\frac{3}{8}$  inch round ( $\frac{3}{8}$  inch square) and band iron up to  $\frac{1}{2}$  by 2 inches. Adjustable stop for repeated cuts to same length. Hardened cutters last indefinitely.

THE FEDERAL  
FOUNDRY SUPPLY CO.



## Bending Press Catalog

The Cyril Bath Company, of Cleveland, E. 70th & Machinery Ave., manufacturers of Sturdybender bending presses, and a large line of special metal forming machinery, national distributors for Steelweld heavy presses and bulldozers, announce a new 36-page die and tool catalog. The book is liberally illustrated with die designs and action photographs, making a valuable treatise on the use of bending presses or press brakes, as they are called by some manufacturers.

## Plastics Folder

Impressive of the ever-widening scope of plastics under the impetus of war, is the folder by Creative Plastics Corp., 936 Kent Ave., Brooklyn, N. Y. Among the problems solved for clients, according to the folder are terminal blocks, lead-ins, close-tolerance laminated terminals, transparent, formed spoons, and a magnifier, claimed to be 40% clearer than glass. The folder is available on request from the firm.

WE INVITE YOU TO TRY

**CRATEX**  
WHEELS AND POINTS

The World's Best Rubberized abrasives for  
Fine Grinding and Polishing

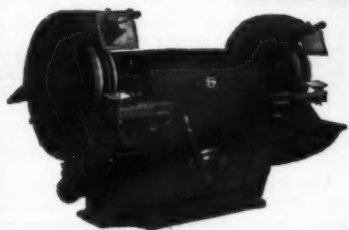
Attach this advertisement to your card or letterhead. We will send you a free trial sample. Or if you prefer send \$1.00 for Special 33 wheel assortment.

CRATEX MFG. CO., 81 Natoma St., San Francisco, Calif.

Powerful leverage makes all cuts easy. Small size permits placing wherever convenient. Small in size but a giant for work. The lowest priced rod and band cutter on the market. Every shop needs one. Hundreds in use. Write today for further details and price.

4602 EAST 71st STREET,  
CLEVELAND, OHIO

The four-speed gear-drive transmission enables you to maintain efficient peripheral speed down to the flanges.



WHEEL REPLACEMENT  
COSTS TAKE A NOSE DIVE  
BECAUSE OF FOUR-SPEED  
GEAR-DRIVE  
TRANSMISSION



## SNAGGING GRINDER

Model 65

Hand lever changes speeds quickly. Electric interlock prevents operation unless gears are in mesh.

for vitrified or high speed wheels

BUY WAR BONDS AND STAMPS

THE UNITED STATES



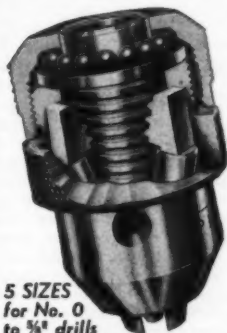
ELECTRICAL TOOL CO.

CINCINNATI,

OHIO, U.S.A.

## EASIER FOR WOMEN TO OPERATE DRILL PRESSES — with *Ettco-Emrick*

### KEYLESS DRILL CHUCKS



5 SIZES  
for No. 0  
to 3/8" drills

Easier because no strength is needed to tighten these chucks. Drilling action does the tightening—and the heavier the load the tighter they hold. But whether your operators are male or female, you get higher drilling production with Ettco-Emrick Keyless Chucks because they eliminate the non-productive, time-and-energy wasting key tightening operation. And as for quality and service, there are no better chucks made. **Bulletin No. 6** gives all details. Write for a copy.

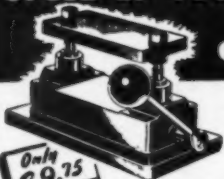
**ETTCO TOOL CO., INC.**

596 Johnson Ave., Brooklyn, N. Y.  
DETROIT CHICAGO

MAKERS

OF *Ettco-Emrick* DRILL CHUCKS • TAP CHUCKS • TAPPING ATTACHMENTS  
MULTIPLE TAPPING AND DRILLING HEADS • TAPPING MACHINES

## SPEED UP TOOLING- CUT COSTS



Only  
29.75

with the  
**UNIVERSAL  
VISE**

Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures—just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. Write for bulletin.

**Mohr Lino-Saw Co.**

130 N. Union Ave.

Chicago, Ill.

## NIELSEN Heavy Duty *Live* Centers



Write for  
catalog on  
live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

**NIELSEN, INC.**

LAWTON,  
MICH.

## SAVE TIME when 'time is short'



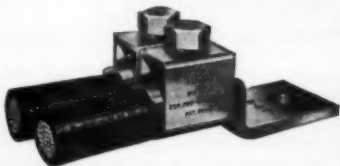
TOOL POST TURRETS FOR ALL LATHE SIZES  
Saves on Setting Up — Saves on Repeat Operations

WRITE

**C-W-C CORPORATION**  
HAWTHORNE, CALIFORNIA

## Multiple Solderless Connectors

The Ilco Copper Tube and Products Co., Mariemont (Cincinnati), Ohio, offers a new development in multiple solderless connectors. Two of these new multiple connectors are now available, LU4 which holds wires from 0 to 350,000 c.m. and LU6 which holds wires



from 250,000 to 500,000 c.m. They are reported to have passed rigid tests of the Underwriters Laboratories and to have been approved in every way. The connectors are simple in design and make a neat installation of maximum efficiency. No special tools are needed as speedy connections are made with wrench or pliers. Electrical efficiency is assured by the use of pure copper of highest conductivity. Because of the pure copper used there is no unnecessary weight as with alloy castings. These connectors have ample contact area to carry sustained overloads. Full details may be obtained from the manufacturer, who also produces a complete line of soldering lugs, solder-solderless lugs, fuse clips, sheet terminals, solderless lugs, solderless terminals, solderless connectors, ground-rod clamps, solderless terminal lugs and solderless service connectors.

**Hundreds of Users Prefer**

**True-Cut TOOL BITS**

where the

**"GOING IS TOUGH"**

Use Gold Tip and Blue Nose Bits on tough jobs like this and watch results.

CENTER DRILLS . . . KEYWAY CUTTERS  
... DOVETAILS . . .  
FORM GROUND TOOLS

Send for Catalog



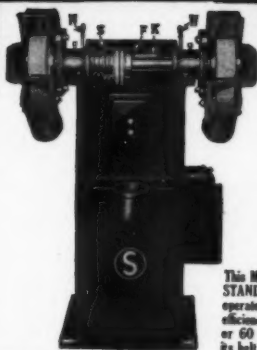
14236 Birwood, Detroit, Mich.

Specially treated to Rockwell "C" 62-65, and are not brittle.



Actual photo of True-Cut Gold Tip Bit. 1 1/16" cut, .020 Feed, 1080 SAE Steel.

*It's* **STANDARD** *for War and Peace*



This MULTI-SPEED STANDARD GRINDER operates with the same efficiency at either 25 or 60 cycles through its belt drive.

**A Multi-Speed Grinder for Multiple Economy**

Peripheral speed is maintained, thus increasing production. Wheel stubs from larger wheels, formerly discarded, may be transferred to this grinder.

**Outstanding Advantages include:**

Safety type hinge door exhaust guards, adjustable to wheel wear. Interlocking arrangement prevents over-speeding of grinding wheels. Push button starting. Available in wheel sizes, 10" to 30" diameter. Suitable for Vitrified and Resinoid bond wheels.

The **STANDARD ELECTRICAL TOOL Co.**  
CINCINNATI • OHIO  
**2489-96 River Rd.**

# Plants for Subcontract Work

**H**ERE are additional plants with machine tool capacity available for subcontract work. Code numbers are used in lieu of names for obvious reasons. Addresses are at all times available for Government Officials, prime contractors and responsible manufacturers.

Address all communications to Subcontract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. (Phone HARRison 6040).

If you have any idle tools in your plant, send a description of your plant and list of tools for listing. It is a patriotic duty for every plant to respond to Donald Nelson's appeal for additional subcontract capacity. There are no charges or obligations involved in connection with listing your subcontract facilities in **The BLUE BOOK**. It is our gratuitous contribution to help speed the American All-Out Victory Program:

**H-54**—Pennsylvania engineering concern has following equipment available for subcontracts: — Hendey lathe 14" swing 36" between centers; No. 0 B&S Universal Milling Machine; Bench lathe 5" x 18"; Cincinnati Drill Press, back geared, drilling up to 2"; Excelsior 2A Power Hack Saw; Bench Drill Press; Metal Cutting Band Saw, 20" throat; Baird Punch Press; small gas hardening furnace; large assortment miscellaneous tools including drills, taps, dies, reamers; B&S Surface Plate 12" x 12"; Taft-Peirce Right Angle Plates; Ames Dial Gage; Micrometers, Vernier Calipers and Vernier Height Gage. Will work to any commercial tolerances.

**H-53**—Connecticut firm that has specialized on new development work, designing, building, research, etc., offers its facilities for any job requiring skill and inventiveness. Instrument shop the small has a variety of precision tools including: 3-foot bench lathe with milling attachment and boring devices; jewelers precision lathe and attachments used for making optical precision instruments;

1/2" drill press; scroll saw; filing machine; gas welding equipment; also completely equipped laboratory for photo and optical work of any kind (metallography for example). Recently developed tool projector for profile and surface projection and a new optical comparator.

**H-52**—South Dakota machine shop, experienced in automotive work, has additional capacity for subcontract work. Has been doing Ordnance Dept. work. Equipment includes 8 Engine Lathes, 16' x 8' to 24' x 12' of American, Monarch, LeBlond, Reed, and Barnes makes; American Planer, 22x22' x 5'; Heald No. 55 Internal Grinder; Ott 6x12", Van Norman No. 88 and Landis 16x48" External Grinders; 5 Drill Presses including Milwaukee 20", Barnes 20 and 26"; Brainerd No. 3 Milling Machine; Buffalo Forge Armor Plate Universal Iron Worker; Vertical Hydraulic Press; Davis Keyseater; 2 Atlas and 4 Logan Bench Lathes; Walker-Turner 4" Polishing Lathe; Johnson 10x18" Metal Cutoff Saw; Sunnen "MA" Bench Precision Hone; Van Norman 6x10" External Grinder; Porter-Cable G-8 Belt Grinder; 3 Lee Tool and Cutter Grinders; Grenby IG2 Internal and Hill-Clarke 10x36" External Grinders; Atlas MFG Milling Machine; Heat Treating Dept., Gray Iron Foundry; Complete Motor Rebuilding Dept., Welding Dept., including 3 gas outfits and 2 arc welders; Forgoing does not include many special machine tools made for surface and radius grinding, etc. Working 50 employees at present; semi-skilled labor is available in any needed quantity.

**H-51**—Indiana Superfinishing Specialists have capacity available for subcontract work. Manufacturers are invited to make inquiry regarding the possibilities and results of superfinish on their work, for recommendations and prices. Any general types of superfinishing work are desired up to 10" diameter x 4 feet long; centerless work up to 2 or 2 1/2" diameter x 4 or 5" long and some types of flat finish work.

**H-50**—New York machine works in Metropolitan area has a newly organized shop with seven 10" swing lathes; 16" lathe; 7" shaper. Wants additional war production work and is anxious to obtain additional equipment justified by any work obtained.

**H-49**—Large Northern Ohio metal fabricating plant is unusually well equipped with punch presses, bending brakes and shears to handle material from 10-gauge up to and including 22-gauge. Also has a large number of spot and arc welders.

### Booklet for Broach Users

A new 24-page booklet containing 2 articles of interest to broach users is now available from Colonial Broach Co., Box 27, Harper Station, Detroit. The two articles, "Answers on Broaching" and "Broach Sharpening Recommendations" (for Longer Broach Life), have been prepared in response to an unusually heavy demand for information relating to methods of increasing war production and improving the quality of output from broaches and broaching machines.

The first of the articles is based upon actual inquiries from broach users. Answers are given to questions covering such subjects as the best types of broaching machines to use for different jobs, factors governing broaching machine speeds, how to avoid "drift" in broaching cored cast iron, the amount of stock that can be removed per broach tooth, proper depth of chip-breakers, and more than 15 other commonly asked questions of a similar character.

The second article discusses methods of increasing broach life as related to sharpening. Included also are recommendations for the storing and handling of broaches, most suitable sharpening equipment, data on surface broach reconditioning and methods of checking to assure peak efficiency and avoid damage from improper sharpening. Drawings showing the proper tooth forms are also included.

### Bulletin on Small Gear Finishing

Manufacturers of small gears (less than 4" in diameter) will find a new descriptive folder of the Michigan Tool 861-4B light duty gear finishing machine of special interest. The new bulletin (No. 861-42) on this latest addition to the Michigan line of gear shaving equipment contains information on the design and operating features of the machine, its scope, speed of operation, etc. Specifications also included cover the range of gear sizes that can be handled, cutter sizes, drive motor data and overall dimensions. Address—Michigan Tool Co., 7171 E. McNichols Road, Detroit, Mich.

## ELECTRO-MATIC RECTIFIERS

### SPECIFICALLY DESIGNED FOR INDUSTRIAL USE—

Precisely engineered to meet increased demand for dependable rectifiers ... In a range of 42 models—from 125 to 3000 watts capacity.

**SIMPLE** in operation. **COMPACT**—can be built directly into your equipment. Many other features.



With the **NEW AUTOMATIC TIME DELAY SWITCH** (in larger units) to protect rectifier tubes. A "money saver and production increaser"—prevents throwing the load on tubes until properly warmed up, etc.

**NEW BULLETIN "61"** gives complete information. **WRITE** for your copy.

### ELECTRO-MATIC PRODUCTS CO.

Makers: **NEUTROL** Electric-magnetic Chuck Control  
2235 NORTH KNOX AVE., CHICAGO, ILLINOIS



**Today**

## **NATIONAL DEFENSE PRODUCTION**

**Requires SPEED!  
SAVE TIME WASTE!**

**Use the BARKER  
Wrenchless Chuck**

Don't let wrenching and adjusting waste your production time—keep your lathes working and not waiting. With the BARKER Wrenchless Chuck the usual chucking time is put into actual production.

It can be adapted to any type of work that may be done on lathes, engine lathes, semi-automatic or pipe threading and cutting-off machines. Users everywhere are getting high percentage increases in production. You can get similar results as soon as you put the BARKER to work.

The BARKER Wrenchless Chuck is simple and sturdy in construction. It is compact—requires no accessories to install. It permits bar work to spindle capacity. A quick movement of the lever releases or grips the work. Well adapted for a diversified line, from small brass castings to heavy forgings. Write TODAY for full details.

*Made in two and three jaw types*

**THOMAS HOIST CO.**

*chuck division*

**24 So. Hoyne Ave.  
Chicago, Ill.**



## **Steel Handbook for Machine Tool Users**

A new Steel Handbook No. 42 for Machine Tool Users is announced by Republic Steel Corp., Republic Bldg., Cleveland, O. It is a wartime edition, the fifth to be published since 1934.

A timely feature is the publication for the first time of the combined standard steel lists of the American Iron and Steel Institute and the Society of Automotive Engineers, Inc. for carbon and alloy steel bars with suggested speeds and feeds for machining many of these grades with standard tools on automatic screw machines. Another new feature is a 15-page section describing and illustrating the various cold finishing processes and giving tolerances, size ranges, standard lengths and other information on various types of cold finished steel.

In addition, the book contains many tables giving rpm of spindles at given surface speeds for work of various diameters, drill sizes and lengths of points, allowances and tolerances for screws and nuts, thread elements and tap drill sizes, physical properties, weights, wire gauges, information on tool grinding and heat treating, decimal and metric conversion tables, stock estimating tables and hardness conversion tables found in previous editions.

The book contains 84 pages, fits easily in the pocket and is thumb-indexed and mechanically bound for easy reference. While intended primarily for the use of those who operate and plan work for automatic screw machines, it contains much information valuable and useful to others interested in the machining of metals. It will be sent gratis if you write on your business stationery.

## **Powder Metallurgy**

Powdered iron parts and bearings to meet modern demand for savings on material, elimination of machining and the need for satisfactory substitutes for critical, restricted materials, are announced by Bound Brook Oil-Less



Bearing Co., Bound Brook, N. J. With 8 formulas, adaptable to wide variety of operating conditions and applications—specifications providing porous iron alloys containing no tin and copper from 0 to 10% maximum—range of flexibility is available. Adaptable to both parts and bearings, the material can be had either with or without lubricant impregnation with up to 25% oil content.

The material, known as "Powdiron," is completely described in a bulletin just issued by the company, in which emphasis is placed on the desirability of the new material as a logical substitute for restricted materials.

### Ohio Planer Bulletin

In 1887, the first planer was made by Ohio Machine Tool Co., Kenton, O. Exemplifying the continuous experience gained in intervening years, is the company's newly published Bulletin No. 500, showing Ohio standard and heavy-duty, double-housing planers, aimed to provide long, accurate

service. Beds, housings and tables are of extra heavy construction and embody special features making for stability and accurate production. Stressed are drive gearing in bed, heavy pitch, wide face-gearing and automatic, forced feed lubrication to vee ways. The latter are furnished with oil pockets and rollers as a safety measure, should oil system fail.

Rail heads are of universal type, graduated, swiveling to 140° and with automatic power feed in all directions. Feed and control to each head are independent; saddles right and left, permitting heads being operated closely together.

Types of drives available are:—(1) belt, with countershaft; (2) plain motor drive on housings; (3) 2-speed motor drive on housings; (4) ordinary reversing motor drive; (5) variable voltage reversing motor drive.

Complete specifications of all models and other Ohio accessories are given in the bulletin.

## COMET

### BORING, FACING and INTERNAL THREADING TOOLS

For holes from 1/8" upward, 15 different sizes

**Made of Super-High-Speed Steel  
Specially Heat Treated**

Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long, useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

Write for complete data.

**COMET TOOL CO.**

738 Broadway, New York, N. Y.



## PRODUCTION GOES UP . . . COSTS COME DOWN



**T**HIS improved type band grinder speeds production in war plants throughout the country. Built to machine tool specifications, the Simplex-M eliminates expensive, slow, hand emerying and filing. It assures a perfect, straight grain, sharp-edged finish on metals, plastics, wood and fibre. Whether your plant is large or small . . . investigate the economies of Simplex-M, today! Variety of styles and sizes.

Informative Booklet on Finishing ★ Write Today  
WALLS SALES CORP., 96 Warren St., New York, N. Y.

### SIMPLEX-M ABRASIVE BAND GRINDER

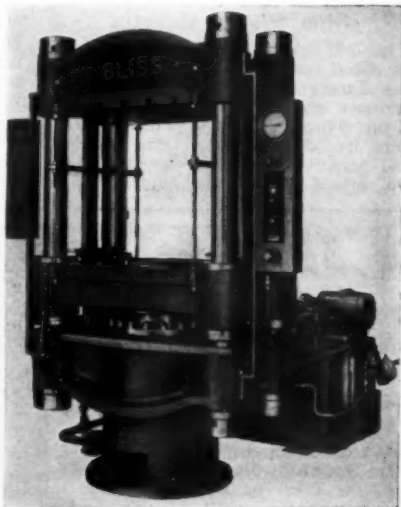
#### Bliss Moulding Press

A 250-ton Hydraulic Press of the semi-automatic hot moulding type with a completely electrically timed cycle has been recently built by the E. W. Bliss Co., Hydraulic Press Div., 53rd and 2nd Ave., Brooklyn, N. Y. The fully automatic timed cycle permits independent adjustment of the lengths of preliminary cure. A variation of this control affords independent timing of a chilling period, if required and an independent timing of flushing of the mould passages at completion of cycle. The ability to change from the quick advance speed to the pressing speed before contact assures entrance into the mould at a slow gentle speed, and is particularly advantageous when working fine moulding powders.

Bliss patented guiding allows expansion of the heated platen but maintains accurate guiding of the platen on the rods of the press by means of bronze bushings with close clearance.

Pressure is adjustable over at least a 10 to 1 range while the automatic cycle may be stopped in any portion of its cycle by means of emergency stop button.

There is no mechanical connection between press and pumping unit. Thus the pumping unit can be placed some distance from press or immediately behind, and covered by a shield which can form a shelf for inspection or other purposes.



#### New Giant Welding Positioners

Cullen-Friestedt Co., 1221 S. Kilbourn Ave., Chicago, announce the addition of 2 new giant C-F Positioners—Model 200 which has a capacity of 20,000 lbs 20" away from table, 8" off center; and, Model 300 with a capacity of 30,000 lbs 24" away from table, 18" off center.

Like the other positioners in the

"C-F" Line, these new giants that swing great weldments and assemblies around as one would turn a bit of steel in his hand are mounted on a single pedestal, which is adjustable for height. They have a table which revolves completely around and tilts to any position up to (or down to) 125 degrees off horizontal. They are of course motorized and are operated by a push button panel so that welder can swing and tilt weldment to any position without use of cranes or handling crew.

### Dual Head Tapping Machine

Another case where 2 heads are better than 1 is found in the new dual head Bakewell Radial Tapping Machine.

The Bakewell Mfg. Co., 2427 E. 14th St., Los Angeles recently developed this model as a companion to the single head Radial in order to speed up war production to a greater extent than was possible before.

The dual head Radial is used for making Class 3 or 4 gage fits in 1 pass in 2 different pieces of work mounted on the 1 base. Or by using

different sized taps, 2 different holes may be threaded on the 1 machine. If desired, a dual head Radial can be equipped with 1 tapping head and 1 drill head so that continuous operation can be had on the same piece of work with a minimum amount of time.

The 3 different working surfaces, 1 on the top of the base, another on the end, and a third at the rear, also provide for speedy tapping work.

Like other Bakewell Precision Tapping Machines, the tap on the dual head is fed into the work by a patented means of hobbled lead screws and electrically operated brass guide fingers. The latter automatically engage the lead screw while passing up and down into the work.

Other well known Bakewell features include safety clutch, which is claimed to prevent tap breakage, a limit switch, and hydraulically operated rams.

Each tapping head is a complete unit in itself and may be separately worked with its own drive motor. The Bakewell Radial has a tapping capacity of No. 4-40 to  $\frac{1}{2}$ " in steels.

## STANDARD REAMERS available from stock

WE LIST as STANDARD many cutting tools formerly in the so-called "special" class. Better yet, the majority of these standard cutters is in stock most of the time. Our line is broad enough to often permit consolidation of tool orders thereby saving valuable time.

Cemented carbide tools are our *specialty*. We make them *exclusively*. Each tool is tipped with the *correct* grade of CARBOLOY best suited to do a cutting job on the metals for which the tool was ordered. (Other brands of carbide can be specified.) You can expect and get uniform, high quality results with Wendt-Sonis tools. Catalog 142 mailed FREE upon request. Ask for it! WENDT-SONIS COMPANY, HANNIBAL, MISSOURI. Write or phone your requirements and priority rating.

# WENDT SONIS

### CARBOLLOY CUTTING TOOLS

Centers • Flute Drills • Core Drills • Counterbores • Spot Facers  
End Mills • Reamers • Hollow Mills • Lathe Bits • Special Tools



W-S Standard Reamers. Tapered and straight shank types.  $\frac{1}{4}$  up to 1  $\frac{1}{2}$ "

W-S Carbide Tipped Centers. Morse, Brown & Sharpe and Jarno Tapers.

W-S Carbide Tipped Core Drills. Straight and tapered shanks. Sizes:  $\frac{1}{8}$  to 1  $\frac{1}{2}$ "

## BUY THEM

For metal cutting results that satisfy. There is a LENOX Distributor near you.

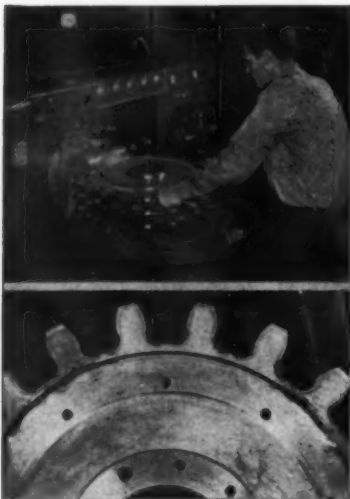
AMERICAN SAW & MFG. CO.  
SPRINGFIELD, MASS



*"The Blade in the Plaid Box"*

### Hardening Tractor Sprockets

The Tocco process of induction heating, cutting down production time in many war industries, is reported to have doubled the speed at which 28" sprockets of heavy-duty tractors may be hardened.



The machine is being used by Cleveland Tractor Co. It was designed and installed by Ohio Crankshaft Co. The sprockets are used to drive the tracks of high-speed tractors which have gone into heavy military duty at airports.

Previously only 6 to 8 sprockets could

be hardened in an hour. But now, approximately 15 of these tractor parts may be hardened in the same length of time by the Tocco process. Each sprocket has 20 teeth and each tooth is tapered from about 1" in thickness at its base to about  $\frac{3}{4}$ " at the top.

The tractor company's problem was to harden the engaging surfaces of the teeth to withstand the wear imposed by contact with driving lugs on the tracks. While the surfaces of the teeth are hardened, the rest of the sprocket must be kept ductile.

Mr. Stillman, Chief Metallurgist for the Tractor Co., points out that one important advantage of the process is the accuracy of control over the depth of the heat treatment and over the area of the hardened zone. The accuracy is made possible by the very nature of induction heating.

The operator places 3 sprockets into the machine at one time. Induction block of the machine contains 3 inductors, each surrounding a sprocket area under treatment. High-frequency current flowing thru the inductors, sets up a current in the sprockets, heating the metal to 1500 F.

Heat is maintained for 10 seconds, and the current automatically shut off. A stream of water then is turned onto the metal, which is quenched for 10 seconds. (Fig.1.)

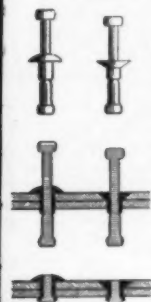
As one cycle of heating and quenching is completed, operator pulls sprockets from the inductor block, sets index on the fixture and moves them forward to begin another cycle.

The hardened zone of a typical sprocket may be seen in Fig. 2. The metal

is S.A.E. 1045 steel and is hardened to 60 Rockwell C.

This machine can be adapted to many different types of heat treating jobs, with changes in design of the inductors.

### Pressure-Tight Cabins



In the manufacture of combat planes for high altitude flying, numerous engineering and production problems have arisen in trying to build pressure - tight cabins, to maintain proper atmospheric conditions at all altitudes. Among other things, the rivets used in "pressurized" cabin construction must not only have normal structural strength but must also hold considerable pressure.

One of the large manufacturers of high altitude planes reports that Cherry Blind Rivets have proved successful for this purpose. Altho designed primarily as a production speed-up for difficult riveting jobs, tests are said to show that Cherry Rivets hold as high a pressure as a conventional rivet, due to the uniformity of head formation and shank expansion and the excellent clinching action obtained thru the Cherry riveting process.

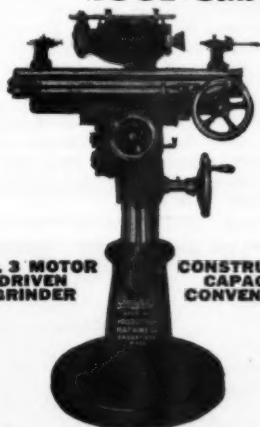
Cherry rivets are claimed to be playing an important part in speeding up aircraft production because they can be applied rapidly in places where it is almost impossible to use a conventional rivet. Standard drilling and dimpling tools are used to apply them. The only special tool required is the gun which is used to pull the stem or mandrel with sufficient force to head the rivet on the blind side and break the stem. As the mandrel is pulled thru the rivet a tulip head is formed on the blind side and the pieces being riveted are securely clinched together.

"Greenfield"

**CUTTER-REAMER**

AND

**UNIVERSAL  
TOOL GRINDER**



**NO. 3 MOTOR  
DRIVEN  
GRINDER**

**CONSTRUCTION  
CAPACITY  
CONVENIENCE**

The No. 3 Motor in Head Grinding Machine is ideally suited to the shop. Its heavy construction and rigidity make it a first class production machine on various types of work.

It is capable of handling most all tool sharpening or tool room grinding, within its capacity. With it may be sharpened straight, taper or rose reamers; spur bevel, spiral, formed or end milling cutters; taps, countersinks or counterbores. It can be quickly set up for the accurate grinding of straight or taper arbors, keys, gages and the edges, sides and the ends of flat, square, hexagon or octagon bars. The holes in cutters, or other small internal work, are easily handled.

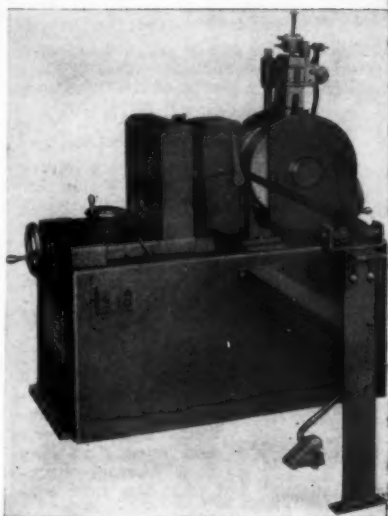
WRITE FOR ILLUSTRATED FOLDER

**PRODUCTION MACHINE CO.**  
GREENFIELD, MASS.

## Hammond "OD" Cylindrical Polishing Machine

An Outside Diameter Cylindrical Finishing Machine with a wide variety of applications in the production of war materials is announced by Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich.

The machine illustrated shows but one of a number of ways in which it can be arranged, using for the polishing member a special wheel with Auto-Doper adapted to the particular work. Can also be arranged with backstand idler pulley and patented segment face contact wheel permitting use of surface-coated abrasive belts which run over face of wheel and to back stand, for polishing and finishing on many materials and shapes of articles previously beyond their scope. Already in use in production lines on such parts as bombs, universal joints, condenser tubing, shell cases, gun barrels (as illustrated) steel tubing and brass magazines, etc., the machine handles parts from 1/4 to 9" od.



# STOP



# DUST

from Grinders with **DUSTKOP**

Quickly attached to any tool, cutter, surface or internal grinder ... Operated by GE motor and fan ... Spun-glass Oversize Filter stops dust and returns cleaned air to room ... **LOW PRICED...** Hundreds now in use in War Work. Prompt deliveries on standard units with high priorities.

Write for Bulletin A-500

**AGET-DETROIT MFG. CO.**

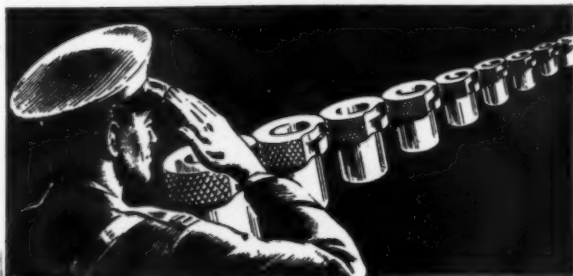
2046 BOOK BLDG.

CADILLAC 3099

DETROIT

The new method of utilizing surface-coated abrasive belts instead of set up polishing wheels is said to effect striking savings as well as increasing production rates. Here are a few of the outstanding results reported for the new technique:—A maker of ammunition cases is thus grinding off flash from welded seams with abrasive belts where previously he used cup wheels—claims production is at 350% of former capacity and abrasive costs are down 25%. A plant producing machine gun parts says that it boosted output by 25 to 55 pieces per 8 hour shift.

The machine is especially adaptable to use of surface-coated abrasive belts with back stand attachment—is designed with a range of feed of 0 to 50' per minute for 1" diameter, forward or reverse and thus would permit inexperienced operators to obtain quality finishes at high production rates. A quick release lever enables operator to control work being fed, by disengaging work from face of wheel. Work



Salute! Stand at attention while they pass in review . . . bushings that keep America's fighting machines rolling . . . bushings that are the basis of America's War Production . . . the **LARGEST LINE OF STANDARDIZED BUSHINGS** available, A. S. A. and ACME Standards.

This great line of standard bushings will surely fit your needs without requiring "special" bushings. But, even if your needs are "special", Acme is equipped to produce them.

*Write for Details on Complete ACME Line today!*



## **ACME INDUSTRIAL COMPANY**

*Makers of Hardened and Ground Precision Parts*

**210 N. Laflin St.**

**Chicago, Ill.**

**MONroe 4122**

support is adjustable to wheel by quick simple means for work of varying diameters. The particular style of type of work support is either Hammond's standard, or specially built for customer's requirements, such as special ball bearing fixtures, guides, etc. All parts are carefully guarded, readily accessible and the guard cover can be removed quickly for changing wheels and abrasive belts.

### **Turret Lathe Color Film**

Recent announcement by Gisholt of a new sound and color motion picture—"Turret Lathes—Their Operation and Use", marked completion of a project undertaken by that concern partially to solve a perplexing industrial problem—the growing shortage of trained industrial workers.

The film, Gisholt's first venture in the field of visual instruction, produced at the direction of the company by Burton-Holmes Films, Inc., is designed to aid in training new machine shop employees.

Subject matter covered includes a

comparison of the turret lathe with other metal working machines and detailed sequences illustrating the basic types of work done on a turret lathe and the production methods followed in each case.



The film is of the 16 mm. size; it will be available to all recognized trade schools, technical schools, manufacturers, and the like—at no charge.

Further information may be had by writing to Gisholt Machine Co., 1185 East Washington Ave., Madison, Wis.

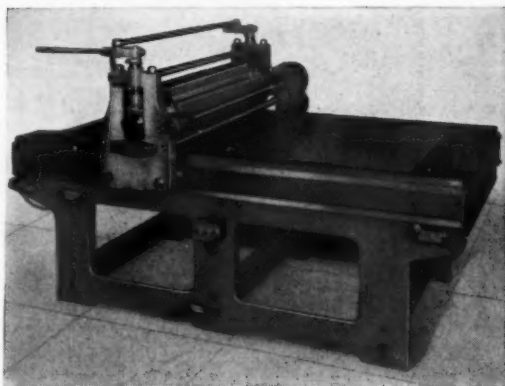


## Wagner Templet Duplicator

A Templet Duplicating Machine, similar in appearance and construction to a printing proof press, is offered by the Charles Wagner Litho Machinery Co., 51 Park Ave., Hoboken, N. J.

The machine is designed to accommodate a scribed sheet metal master templet, such as used in aircraft manufacture, and to print an impression of it on a duplicate sheet. The duplicate impression is in black with all scribed lines appearing in white. Any required number of duplicates may be made.

In operation, the master templet is secured in position on bed at the right of the machine, and then coated with



ink by means of a hand roller. Depressing a pushbutton, the motor-driven printing roll assembly advances and takes an impression from the master which is imprinted on a duplicate sheet held on the bed at left side of the machine. This transfer is accomplished by means of a rubber blanket attached to the printing roll.

The master bed can be adjusted to accommodate sheets up to  $\frac{1}{4}$ " thick. The duplicate bed is designed to handle sheets of any thickness up to 1". The bed size is 48x84", larger templates being printed in 2 operations. A hand crank is provided for operating the machine in the event of power failure.

### Sprinkler Cleans Air-Cleaner

Air, oil and water are used in a motor driven sprinkler system developed by the Westinghouse Electric & Mfg. Co., to speed the cleaning of electric cells which collect dirt from the air in steel mills. The sprinkler does the job 10 times as fast as the old hand method. The electric cells are part of a Westinghouse air cleaner called a Precipitron which attracts dirt particles like a magnet and prevents short circuits that would be caused by dirt wedging between the terminals of a steel mill motor.

## On The Level

**they're better!**

Simplex Machinists' Jacks speed leveling of work on planers, milling machines and other machine tools. Notched base for fastening to bed. Self-leveling ball and socket cap. Side lock nut holds screw at desired height. 4 sizes: 2  $\frac{1}{4}$ ", 3  $\frac{1}{4}$ ", 5  $\frac{1}{4}$ " and 7  $\frac{1}{4}$ " closed heights.



**Ask your machinery dealer.**

Templeton, Kenly & Co.  
Chicago, Illinois

Better, Safer Jacks Since 1899





## Angle-Set Vise

"The "Universal" 3-Way Vise holds work rigidly for milling, drilling, boring, reaming, grinding, shaping, die sinking, checking—in fact for any operation on or off a machine tool involving either single or compound angles. According to makers, it is especially useful for grinding complex toolbit shapes—for drilling holes at hard-to-get-at angles—for milling tool blanks for carbide inserts, etc.

It can replace many special fixtures. Ease of setting any complex angle, and interchangeability of jaw plates, makes the Universal an ever-ready fixture for short or preproduction runs. It is fully portable and may be moved from machine to machine without removing the work or disturbing the work angle. Two large lugs on the base provide easy rigid bolting.

The double swivel cradles (each allowing 90° adjustment), over a full swiveling base (allowing 360° rotation), provide 3 separate motions, individually adjustable and lockable. The wedge locks are said to be 2,000 lb.



torque tested. Jaw opening is 5" and weight is 70 lbs. It is manufactured by Universal Vise & Tool Co., Parma, Mich.

## C-F POSITIONERS

*are universal tools  
... for handling and  
holding work*

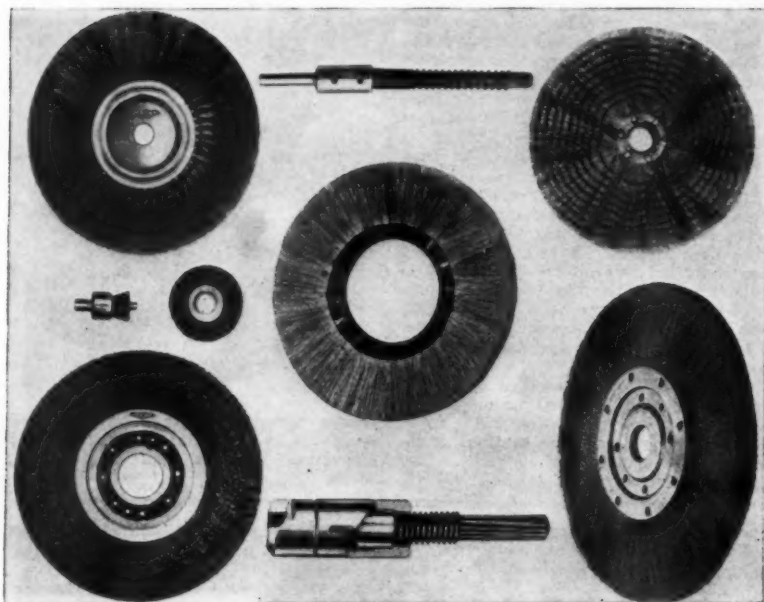
Capable of tilting, turning and holding giant weldments and assemblies so that every weld can be made down hand, C-F Positioners also save time, labor and lower the cost of positioning and holding work for chipping, snagging, grinding, flame hardening and machining operations like angular drilling, etc. Today C-F Positioners are found not only in the welding shops but in machine shops, die shops and production lines as well. 6 sizes, capacities from 1,200 lbs. (hand operated) to 30,000 lbs. Each a universal tool, pedestal mounted, adjustable for height, with table that turns completely around and tilts at any angle to 135° from horizontal.

Write for Bulletin WP 22.



**CULLEN-FRIESTEDT CO.**

## Brushes in Aircraft Engine Work



Nine of the many Osborn brushes used in the manufacture of airplane engines. They are (left to right) Top Row.—Disc Center Wire Section with surface speeds of over 10,000 feet a second, cutting rapidly with very little pressure; Cable End brush; Riehl Section wire brush with a high face density. Center Row.—Bonding brush for cleaning burrs from holes; Ringlock steel wire section for buffing castings; treated Tampico Section for removing tool marks from airplane motor parts to eliminate possible stress concentration points. Bottom Row.—Osborn Master Wheel; weld cleaning brush; Monitor Section wire brush.

Manufacturers of aircraft engines today are making unusual demands upon the versatility of industrial brushes.

Before one type of engine can be completed, a large number of different types of brushes must be used on it, according to R. O. Peterson, Technical Director of The Osborn Mfg. Co., Cleveland. Some of these airplane engine brushes are among the 100 new types which Osborn has developed for war uses during the last 18 months. Many of them are actual "precision tools" used to increase production speed and cut down cost.

Among applications of the brushes for aircraft engines are the removal of rough edges and burrs, removal of heat scale and elimination of "stress concentration points" from moving parts in order to prevent breakdowns.

One brush consists of 6 sections, either 12 or 14" in diameter, mounted together and used for polishing connecting rods. The sections, made of Tampico fibre, are mounted together and used with a polishing jack. They rotate from 2,400 to 2,800 rpm. A modification of this form is a Tampico Section 6" in diameter and operated on a polishing jack for the finishing of smaller parts.

# MILLER

WORKS AROUND CORNERS

## FLEXIBLE SCREW DRIVER

**A** practical, durable screw driver that actually "works around corners." One of the most valuable small tools ever put into a shop.

Saves loss of time and temper on jobs in awkward places that can't be reached by a straight or offset driver.

Laminated steel shaft; specially hardened screw driver bit. Shock-proof handle. Length overall 8".

Efficient in production and assembling operations or for servicing small machines

**MILLER FLEXIBLE DRIVE SOCKET SET**—Same construction as Screw Driver. Set contains 6 Hex Sockets from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " and flexible drive 10" long. All packed in handy metal box.

Write for literature and prices

**L. B. MILLER COMPANY**

2123 Avenue U

Brocklyn, N. Y.

Shaft of Laminated Steel Wire, not a Coiled Spring.

U. S. Pat.  
2,023,693

You'll wonder  
how you ever  
got along  
without it.



A Disc Center Section, 12" in diameter and composed of 0.0118" wire, is operated on a polishing jack at approximately 2,800 rpm to remove heat scale from gears and other engine parts.

A Twisted Wire Tube Brush, 3" long, and made of 0.007" wire, is used for cleaning inside push rods.

To remove heat scale from places that are hard to reach, a special end brush is used. This is  $\frac{3}{8}$ " in diameter, using 0.008" SA wire with a  $\frac{7}{8}$ " trim.

Several types of Ringlock Sections and Tampico Sections are used to remove burrs and polish gear teeth or large parts. They are operated at high speeds on flexible shaft equipment.

### Castor Oil Coolant

Konag colorless coolant with the advantages of Castor Oil's lubricating powers, is fully described in a new folder offered by National Graphite Co., Inc., 17 John St., New York. Said to give better lubrication at tool cutting-edge, resulting in better finish, longer life and greater precision in tools, usual ratios of dilution vary

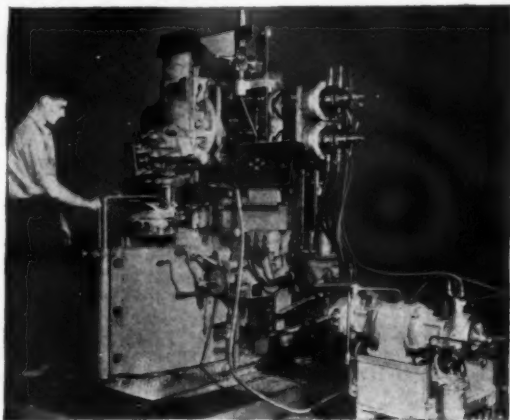
from 1 part Konag Jelly to 20 or more of water, depending upon individual preferences of operators. On many machines, however, the folder points out, 1 to 40 is used. The jelly, it is said, can be dissolved in 40 times its volume of water with resultant solution still having satisfactory lubricating properties of the Castor Oil content. Circular descriptive of National's Konag transparent cutting oil . . . straight Mineral-Sulphurized - Degummed Castor cutting oil (Paluzek process) is also available.

### Transmission Folder

Gears & Transmissions Corp., 3601 S. Claremont Ave., Chicago, has a new offset broadside, in patriotic colors and catchy frontis piece illustration. Folder lists stellar items from the firm's line of transmission equipment, including gears, sprockets, chains, pulleys, ball bearings, couplings, etc. The plant affords 24-hr service, and announces the broadside as the opening gun in its campaign to aid American war production toward "Keeping 'Em Running."

## Standard Bullard Lathe Form-Turns Torpedo Parts Automatically . . .

Automatic, hydraulic control hook-up which turns feed screws of this vertical lathe, improves accuracy of work and speeds production. Exact contour of templet is reproduced on the work.



**F**ORGED steel parts for torpedoes are now being form-turned automatically on a standard Bullard ver-

tical lathe without special rebuilding of the machine or without special training of the operator—and with much greater speed and accuracy than possible with manual control, alone.

**Torque Wrench**

**MORE** ACCURACY  
LIFE  
SPEED

3 DIALS

**NO** FRICTION  
ADJUSTMENTS  
MOVING PARTS  
FRAGILE MECHANISMS

Constructed for exacting laboratory and  
continuous production use.  
A gentler, more correctly explained  
PERMANENT ACCURACY.  
A capacity and size to fit your needs.  
Tools capacity needed.

POWER MANUFACTURERS OF  
ACCURATE MEASURING INSTRUMENTS

PA **STURTEVANT CO**  
ADDISON, ILLINOIS

Use of a Duplimatic, a precision machine tool control manufactured by Detroit Universal Duplicator Co., 253 St. Aubin Avenue, Detroit, to turn the horizontal and vertical feed screws of the Bullard lathe, has resulted in stepped-up production on the roughing cut and such accuracy on the finish that hand-finishing has been greatly reduced and scrapped work is virtually eliminated, the makers say.

Close limits are possible because the Dual Duplimatic, employed for the operation turns 2 feed screws simultaneously, yet independently of each other and entirely independent of machine feed. Moreover, other work, also requiring duplicating in two dimensions on a full automatic basis, without machine feed, can be alternated with the torpedo part turning.

**Buy U. S. War Savings  
Bonds and Stamps**

## The CRITERION Carbide Tool Grinder

**GREATER  
PRODUCTION  
CAPACITY**

Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.

**CRITERION**  
MACHINE WORKS  
BEVERLY HILLS, CALIFORNIA

## DIAMONDS for Victory

**BIG-HEAD-NIBS  
LOC-KEY-SET  
RE-SET-ABLE**



Grinders  
instruction  
card free.

Cooler dressing  
Closely tolerances  
Micrometer Accuracy

Because: Wing key  
heat dissipation  
and absolute dia-  
mond lock nib.

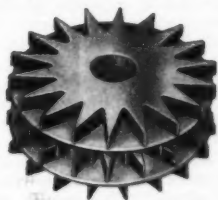
• Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

All diamond sizes 1/4 to 10 karat are nib mounted for immediate shipment... Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.)

Send specifications and prints for prices on turning and boring form tools.

**DIAMOND TOOL COMPANY, Nat. Inc.**  
Sheldon M. Booth, Pres.  
925 E. 41st Street CHICAGO, ILL.

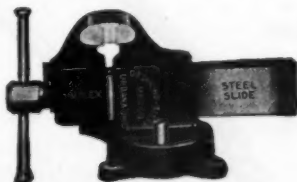
## DESMOND GRINDING WHEEL DRESSERS and CUTTERS



We can supply you with the proper Dressers and Cutters for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

## SIMPLEX Steel Slide VISES

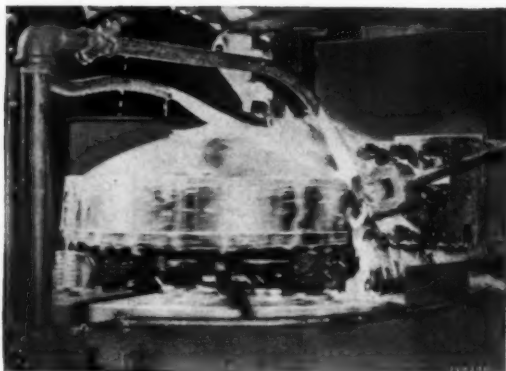


A full line of Machinists' Vises, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

**The DESMOND-STEPHAN MFG. CO., Urbana, Ohio**

Two cuts—note depth—rough and finishing, are made automatically, at high speed, by the machine, minimizing "human element" hazards and rejects.



The 2 drive heads—consisting of hydraulic motors and reduction gearing—are directly connected with the vertical and horizontal feed screws, respectively, and are connected by means of heavy-duty hose with the Duplimatic. Tracer mechanism, mounted solidly on the bed of the lathe is so arranged that its stylus can encounter

edge of a metal template mounted on head moving with the cutting tool. Operator's control panel with start, stop and 4 change-of-direction buttons is located immediately below and to the left of drive heads.

When work is loaded, operator touches start button and cutting tool moves in toward the work. As tool approaches work, stylus of the tracer encounters template and, thru function of the Duplimatic, turns horizontal feed in relation to vertical feed so that tool moves in exact conformity with outline of the template. Thus, exact contour of the template is reproduced on the work itself.

Some idea of capacity of the Bullard with the Duplimatic control will be had by noting depth of cut in close-up. Two cuts are made on this machine; roughing cut and finishing cut. Both are, of course, controlled automatically by the Duplimatic and both are run at high speed.

It is expected that this machine will also be used for work requiring manual control alone. Changeover to do this requires only the "de-clutching" of drive heads and removal of tracer head from its mounting bracket.

When other work which also requires duplicating control is to be machined, template is removed and replaced by one having the contour of the new work. Otherwise, no other changes are required.

## WHITNEY-JENSEN PRODUCTS

30 YEARS EXPERIENCE

### AIRCRAFT RIVET SQUEEZERS

25  
SIZES



Standard (shown), Alligator, Crab, Snake Head, and Pelican types for handling aluminum rivets up to 1/4". 25 different sizes in various types. Widely used in aircraft industry and by sub-contractors. Write for Whitney-JENSEN General Catalog.

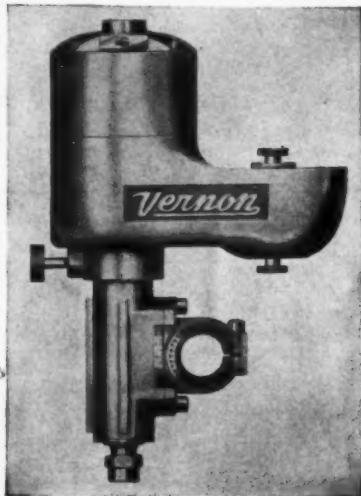
WHITNEY METAL TOOL COMPANY

115 FORBES ST.

ROCKFORD, ILL.

## Vertical Milling Head

Announced by Machinery Mfg. Co., 1951 E. 51st St., Vernon, Los Angeles, Cal., is a reducer, especially designed for use on the Vernon No. 0 Milling Machine.



The head is rigidly supported on the overarm and may be reversed, using the motor on either side. Reversible feature extends range of useful table travel approximately 3". Complete 360° rotation can be made in the vertical longitudinal plane, and settings can be duplicated quickly by referring to both ends of overarm housing. Transverse swivel rides on a 3" pilot and can be rotated 25° each side of vertical. Graduations, 30° each side of 0 setting, are accurately cut on spindle housing. Each angular setting of head is securely locked by 2 large, hardened socket-head cap screws. Squaring faces on the spindle housing are provided for vertical positioning of the spindle in both planes.

The 1 3/16" spindle is made of 4140 steel, heat-treated, ground and mount-

ed in double row, precision pre-loaded ball-bearings at the end. These bearings are sealed with a special oil retainer of Saetan leather which effectively keeps lubrication in and foreign material out. Long bearing and retainer life is claimed even at high operating speeds. Upper bearing is a single row precision ball-bearing type and equipped with a Gits Oiler for convenient lubrication of both bearing assemblies. Spindle speeds are 280, 525, 933, and 1750 r.p.m.

The milling head is equipped with special collets for quick ejection of cutters and tools. Collets are tightened by a large nut on the spindle nose, 2 wrenches being furnished for the operation. Collet sizes furnished with the head are 1/4, 3/8, and 1/2". Special sizes from 1/8 to 7/16" by 16ths are available. Jacobs chucks and offset boring heads can be furnished with 1/2" straight shank to fit the 1/2" collet if required.

The 1/3 h.p. motor is ball-bearing equipped, 50-60 cycle, single phase, 110-220 volt, and includes built-in snap switch and cord. Motor speed is 1750 r.p.m. on 60-cycle current. Loosening a knurled hand lock permits motor and speed reducer to be swiveled independently of spindle housing to any convenient position. Speed reducing pulley is ball-bearing mounted and supported in a yoke which is adjustable for belt tension. Movable yoke permits quick V-belt changes and is locked in position by two knurl-headed screws. All belts and pulleys are fully guarded.

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## Super Sight Adapted to Industrial Use

Four new models of "Super Sight" adapted to close inspection, small parts assembly and precision machining are announced by . . . Boyer-Campbell Co., 6540 Antoine St., Detroit.

No. 95CZ Super Sight has 2 magnifying lenses (top lens 5", lower lens 4"), lower lens adjustable to proper focus—lenses lighted separately—permit using 1 or both lenses as occasion demands. Head is balanced to bracket and instantly put in any position over a wide bench area, when required. Equipped with universal brackets (T-slot or G.S.114). For Precision Machining.

No. 44CZ Super Sight has 1 magnifying lens (4" diameter); head balanced to bracket and can be used in any position over a wide bench area.



No. 89CZ Super Sight has 1 magnifying lens (5" diameter); head balanced to bracket enabling its use over a wide bench area. For Inspection, small parts assembly and bench work.

No. 89U Super Sight has 1 magnifying lens (5" dia.); fitted with safety lens to protect magnifying lens.

## New Book on ARC WELDING

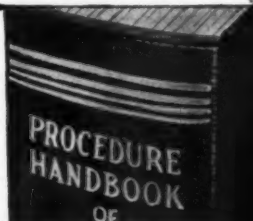
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  - VII. Structural Design
  - VIII. Applications
  - IX. Reference data
- Size 6" x 9" x 1 3/4"



## Grinding Wheel Handbook

"Grinding Wheels—Their Construction and Selection" is the title of a new 8-page illustrated data booklet published recently by the Mid-West Abrasive Co., 1960 E. Milwaukee Ave., Detroit. The booklet, printed on heavyenameled paper, contains 22 halftone photographs of various types of Mid-West grinding wheels, honing and superfinishing stones and 20 sectional diagrams of the same. Primarily educational in character, it presents a comprehensive picture of how grinding wheels and other solid abrasives are made and what they are made of, as well as a number of highly interesting tables and charts detailing grain and grade specifications, recommended grinding wheel speeds, minimum spindle diameters and wheel weights and some functional facts of grinding wheel operation. Also included are two tables unveiling the mysteries of wheel selection and wheel markings. One section, devoted to honing and superfinishing stones, contains instructive charts on honing and superfinishing stone recommendations.

## Improving Wet Grinding Finishes

Plant Engineers and wet grinding equipment operators have long sought means of improving the degree of finish on wet grinding equipment.

Grind-All is offered as a product designed to accomplish such improvement in finish. It is a concentrate and is used on a basis of one quart to 30 gallons of your present grinding fluid. Grind-All is immediately miscible with all grinding solutions.

The manufacturer guarantees a much finer degree of finish, plus savings in time for wheel dressing. Grind-All is claimed to keep the wheel open for much longer periods of grinding—thereby less wheel pressure is necessary on the material being ground and shut-downs for wheel dressing are said to be less frequent.

If not available from the mill supply jobber in your locality, write the Stadoil Mfg. Co., 617 So. Beacon St., Dallas, Texas.

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## South Bend 10" Turret Lathe

A new floor type South Bend Turret Lathe has recently been announced. It is designed for the rapid production to close tolerances of small chucking or bar work. Second operation work can also be handled efficiently. It has a 10" swing over the bed or saddle wings, 1- $\frac{3}{8}$ " hole thru the headstock spindle, and 1" collet capacity.



The lathe is equipped with both a compound rest cross slide and a hand-lever cross slide, which are interchangeable. The latter is furnished with front



and rear tool blocks which provide positions for 3 tools. A quick change gear box supplies 48 longitudinal power feeds for universal carriage, 48 power cross feeds for compound rest cross slide, and 48 thread cutting feeds, 4 to 224 per inch. The handlever operated bed turret indexes automatically and has an adjustable stop for each of the 6 turret tool positions. The underneath motor drive and back gears deliver 12 spindle speeds ranging from 50 to 1357 rpm. The lathe is available either with or without coolant equipment.

Tooling for special work or second operation jobs is simplified by a large assortment of attachments and accessories. For information write South Bend Lathe Works, Department M6, South Bend, Ind.

## Standardizes "Shell" Taps

Said to speed both production and deliveries, a line of production-standardized special taps for tapping both ends of 40 and 20 mm. shells is now being produced by Detroit Tap and Tool Co., 8432 Butler St., Detroit.



The line was developed by Detroit Tap as the result of an extensive field survey. A year ago, virtually every shell manufacturer had his own special tap specifications and designs for the same operations. Since the "com-

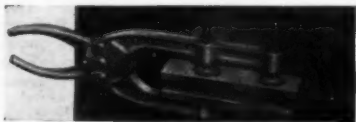
promise" designs were developed by the Detroit organization, over half of the shell producers whom it supplies have already adopted the new taps. This has made possible putting their manufacturing on a quantity-production basis, greatly expediting delivery.

### Knu-Vise Adds Fixtures

Four new clamping devices, each said to be a forward step toward contributing a definite speed factor in production, are now offered by Knu-Vise, Inc., 1334 Plumb St., Detroit. They consist of:



(1) Midget Clamp, with bolt retainer integral with toggle-bar, said to eliminate variation in spindle positions. For heavy clamping pressure in holding small parts.



(2) Parallel Clamping Pliers, in which extended, parallel jaws, with 2 spindles, are said to give more uniform pressure over wider areas. The firm states that these pliers are already being used to advantage in the plywood field, and in making plywood aircraft.

(3) U-Shaped Toggle-Bar, permitting simultaneous clamping of small parts, regardless of their thickness. Slotted toggle-bar allows free horizontal movement of the 2 rubber-capped spindles for positioning over work. Once adjusted, they are said to remain in fixed positions. Repeated clampings always afford the same pressure. Flip of the handle is all that's needed to engage or release.



(4) L-Clamp. Advanced as an entirely new design in clamps, resulting from a recognized need in aircraft construction, for holding L-sections more satisfactorily. Handy where spaces are limited or large throat capacity is needed. Handles at right angles to clamping position. Clamp can be placed in any position and not project so as to cause an obstruction. Rubber caps on contact places, prevent slippage and marring of fine surfaces.



### Details Bench Grinders

Stanley Works, New Britain, Conn., offer a new folder, Grinders For Industrial Uses. Wide range of models is shown. Some are equipped with the firm's "Flud-Lite" eye-shields. They protect eyes while, at the same time, throwing proper light on the work. They are to be had separately to fit all bench and belt-driven grinders.

The folder, which may be had from the company on request, also details contour grinders, portable grinders, flexible shaft grinders and their accessories.

## Plant Operation Idea

"Forty-nine Days From Idea to Plant Operation" is the speed record recently set by Johnson Gas Appliance Co. Cedar Rapids, Ia., in producing a specially-built, heat-treating furnace for one of the nation's busiest war plants.

When Johnson engineers were confronted with this manufacturer's heat-treating problem, they immediately set to work, designing and building a furnace to produce 2000°F. and maintain this temperature for constant operation. On the 49th day after the problem was submitted, the furnace started operating in the plant.

Inside combustion chamber measurements are: 36" wide, 30" high and 60" long. It is lined with  $5\frac{1}{2}$ " insulation and faced with  $4\frac{1}{2}$ " insulating refractory.

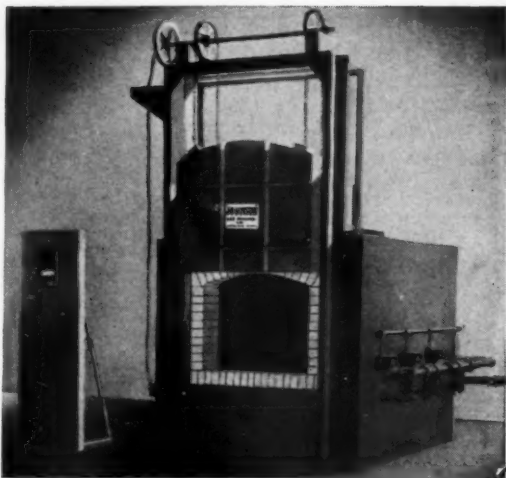
Among the unusual features of this furnace are electrically operated door which raises in 5 seconds and stops automatically; proportioning-type control which automatically regulates furnace temperature and stack damper position; push-button electric ignition that lights burners with complete safety.

Standard Johnson units can be delivered in 2 weeks, on A1-J priority rating or better. Catalogs showing all standard Johnson gas appliances will be sent on request.

### Wiley's Tool Grinder

A new double-end grinder has just been announced by Wiley's Carbide Tool Co., 1344 W. Vernor Hwy., Detroit. Design incorporates recent improvements claimed to provide greatest efficiency in free hand grinding of tungsten carbide tipped tools, as well as other types of tool bits.

It is furnished with coolant pump and pan for wet grinding.



Motor is special design, available for 220 or 440 volts—60 cycle, 3 phase, 3450 rpm. Accurately machined tool rest table is adjustable to all angles between 30° towards wheel and 30° from wheel. Table is also adjustable, with quick clamping features to compensate for wheel wear.



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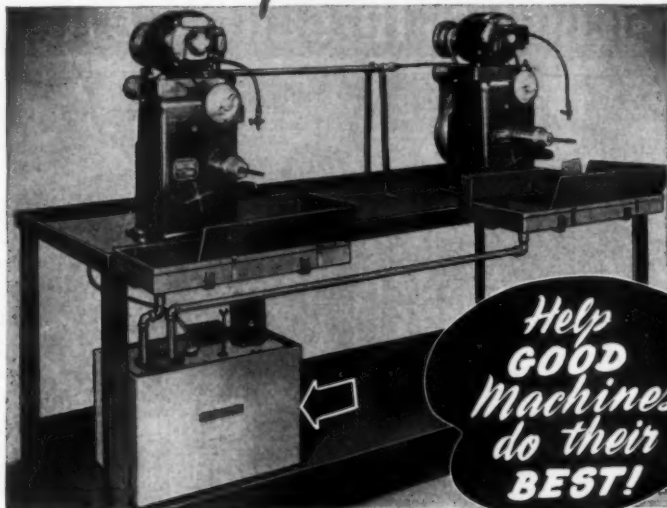
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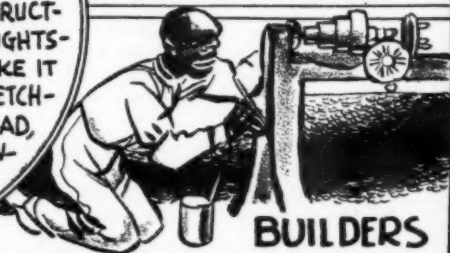


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MAKERS OF STANDARD AND SPECIAL CEMENTED CARBIDE TIPPED TOOLS

# Index To Advertisers

## A

Abrasive Dressing Tool Co.	308
Aerne Diamond Tool Co.	166
Aerne Industrial Co.	363
Aerne Tool Co.	321
Aerosmark Corp.	346
Agat-Detroit Mfg. Co.	513-362
Aircraft Mcky. Corp.	268
Airway Pump & Equipment Co.	345
Ahlberg Bearing Co.	53
Ajax Engrg. & Mfg. Co.	231
Alco Tool Company	329
Allegheny-Ludlum Steel Corp.	57
Allen, Alva F.	216
Almond Mfg. Co., T. R.	329
American Broach & Machine Co.	126
American Diamond Tool & Gage Co.	283
American Measuring Instruments Corp.	41
American Metal Works	134
American Photocopy Equipment Co.	297
American Saw & Mfg. Co.	360
American Tool Works	277
Ames Co., B. C.	140
Anderson Bros. Mfg. Co.	293
Angle Computer Co.	346
Anker-Holth Mfg. Co.	175
Armstrong - Blum Mfg. Co.	Inside Front Cover
Armstrong Bray & Co.	294
Armstrong Bros. Tool Co.	4
Aro Equipment Corp.	159
Arter Grinding Mch. Co.	183
Atlantic Mchry. Corp.	291-318
Atlantic Saw Mfg. Co.	263
Atlas Equipment Co.	326
Atlas Press Co.	155
Automatic Machine & Tool Co.	323
Automotive Maintenance Machinery Co.	145
Auto Moulding & Mfg. Co.	234
Auto Ordnance Corp.	42-43
Avery Adhesives	34
Avery Drilling Machine Co.	56

## B

Bakewell Mfg. Co.	136
Baldor Electric Co.	146
Barlett Engineering Co.	108
Baumbach Mfg. Co., F. A.	261
Bay State Abrasive Products Co.	77
Berco Mfg. Co.	119
Berkeley Equipment Co.	149
Besly Co., Chas. H.	255
Beverly Shear Co.	307
Black Drill Co.	289
Blake Co., Edward	123
Blanchard Machine Co.	198
Blank & Buxton Machinery Co.	251
Bliss Co., E. W.	172
Blount Co., J. C.	103
Boice-Crane Co.	177
Boyer Schults Corp.	281
Brady-Penrod, Inc.	170
Brand Tool & Supply Co.	294
Brauer Machine & Supply Co.	60
Bremil Mfg. Co.	325
Breuer Electric Company	230
Brewster-Squires Company	142
Bridgeport Machines, Inc.	113
Bridgeport Safety Emery Wheel Co.	110
Brown Corp., W. H.	311
Brown Engineering Co.	142-338
Brown & Sharpe Mfg. Co.	285
Bryant Chucking Grinder Co.	39
Buffalo Forge Co.	257
Builders Iron Foundry	263

Burks Machine Tool Co.	325
Burr & Son, J. T.	96
Busch Co., J. C.	241

## C

C. W. C. Corp.	352
Canedy-Otto Mfg. Co.	20
Capewell Mfg. Co.	260
Carbide Fabricators	381
Cardinal Machine Co.	265
Catskill Metal Works	237
Central Tool Co.	241
Cerro De Pasco Copper Corp.	29
Challenge Machinery Co.	253
Chicago Die Casting Mfg. Company	324
Chicago Mfg. & Dist. Co.	26
Chicago Rivet & Machine Co.	218
Chicago Tool & Engineering Co.	141
Chicago Wheel & Mfg. Co.	194-195
Cincinnati Electrical Tool Co.	388
Cincinnati Grinders, Inc.	9
Cincinnati Milling Machine Co.	38
Cincinnati Tool Co.	331
Circle Tip Tool Co.	222
Clements Mfg. Co.	96
Cleveland Tool Eng. Co.	165
Cleveland Twist Drill Co.	83
Colborne Mfg. Co.	349
Colonial Broach Co.	201
Colwell, Co., S. G.	288
Comet Tools, Inc.	357
Comtor Co.	310
Cone Automatic Machine Co.	19
Continental Machines, Inc.	Front Cover
Conway Clutch Co.	163
Cooley Elec. Mfg. Corp.	18
Coulter Machine Co., James	204
Covel Manufacturing Co.	225
Cratex Mfg. Co.	350
Criterion Machine Works	369
Cullen-Friededt Co.	365
Cullman Wheel Co.	Back Cover

## D

Daily Machine Specialties	48
Darnell Corp., Ltd.	335
Dearborn, J. W.	309
Dearborn Gage Company	215
Delta Manufacturing Co.	59
De Sanno & Son, A. F.	61
Desmond-Stephan Mfg. Co.	369
Despatch Oven Co.	181
Detroit Power Screwdriver Co.	237
Detroit Tap & Tool Co.	151
Detterbeck Co., Geo. L.	168
Diamond Tool Co.	369
DoAll Company, Inc.	106
Douglas Machinery Co.	275-300-322
Dreis & Krump Mfg. Co.	95
Drive-All Mfg. Co.	196
Durant Mfg. Co.	148
Dykem Co.	154

## E

East Shore Machine Products Co.	214
Economy Machine Products Co.	144
Eisler Engineering Co., Inc.	228
Electro-Matic Products Co.	355
Elgin Tool Works	221
Elmes Engineering Co., Chas. F.	79
Eyrington Mechanical Laboratory	341
Etco Tool Co.	351
Evans Flexible Reamer Co.	227
Ex-Cell-O Corp.	135
Excelsior Tool & Machine Co.	261
Experimental Tool & Die Company	336

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Tool No. RH	LH	Shank Size
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R-101	L-102	5/16x5/16x2 1/4
R-103	L-104	3/8x3/8x2 1/2
R-105	L-106	7/16x7/16x3
R-107	L-108	1/2x1/2x3 1/2



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## Right-200 Series

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201	5/16x5/16x2 1/4
202	3/8x3/8x2 1/2
203	7/16x7/16x3
204	1/2x1/2x3 1/2

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Tool No.	Shank Size
300	1/4x1/4x2
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302	3/8x3/8x2 1/2
303	1/2x1/2x3 1/2



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<b>F</b>	
F. & M. Sales Company	168
Federal Foundry & Supply Co.	350
Federal Press Co.	316
Federal Products Corp.	191
Fell Co., Wm. H.	335
Fellows Gear Shaper Co.	121
Field Abrasive Specialty Mfg. Co.	152
Fisher Tool Co.	245
Foley Mfg. Co.	264
Fray Machine Tool Co.	272
Fulfilo Specialties Co.	208

<b>G</b>	
Galland-Henning Mfg. Co.	187
Gallmeyer & Livingston Co.	Inside Back Cover
Gardner Machine Co.	97
General Engineering & Mfg. Co.	200
General Machine Tool Co.	31
Genesee Tool Co.	233
Gilbert & Barker Mfg. Co.	302
Gilmore & Co., F. F.	265
Gilron Products Co.	132
Gits Brothers Mfg. Co.	279
Given Machinery Co.	179
Glenner Co., J. C.	167
Gorton Machine Co., Geo.	73
Graham Mfg. Company	202
Granite State Machine Co.	342
Grant Mfg. & Machine Co.	334
Gray-Mills Co.	271-379
Green Mfg. Co.	299
Greenerd Arbor Press Co.	319
Grenby Manufacturing Co.	282
Grob Brothers	96
Grobet File Co. of Am.	332-333

<b>H</b>	
Hack Machine Co.	114-115
Hales Div., Ajax Eng. & Mfg. Co.	231
Hamilton Tool Co., The	293-294
Hammond Machinery Builders	178-337
Hannlin Mfg. Co.	33
Hansen Manufacturing Co.	169
Hardinge Brothers, Inc.	3
Hart Machine Co.	276-277
Hartford Special Machinery Co.	331
Harvey Mfg. Corp.	319
Haskins Company, H. G.	107
Hassall, Inc., John	295
Heimann Mfg. Co.	234
Heller Bros.	64-A
Hevi-Duty Electric Co.	147
Hobart Brothers Co.	1
Hotel Metropole	338
Howe & Son, Inc.	272

<b>I</b>	
Ideal Commutator Dresser Co.	296
Illinois Testing Laboratories, Inc.	303
Industrial Chemical Products Co.	298
Industrial Products Suppliers	333

<b>J</b>	
Jackson Machine & Tool Co.	290
Jacobs Mfg. Co.	88
Janette Mfg. Co.	280
Jarvis Co., Chas. L.	15
Jefferson Mach. Tool Co.	45
Johnson Machine & Press Corp.	345
Johnson Mfg. Corp.	385
Jones and Lamson Machine Co.	6-7-81
Jursek Machine & Engrg. Co.	164

<b>K</b>	
Karlson, Inc., E.	317
Kirk & Blum Mfg. Co.	17
Knight Machinery Co., W. H.	91
Knu-Vise, Inc.	52
Koebel Diamond Tool Co.	346

<b>L</b>	
L. & J. Press Corp.	206
L-W Chuck Co.	193
LaSalle Designing Co.	64-B-64-C
Leach Mehry, Co., H.	189
Lee Co., K. O.	82
Lempco Prod. Inc.	223
Leslie Welding Co.	272
Lewis Machine Tool Co.	180
Lewitwaite Machine Co., T. H.	304
Liberty Tool & Cage Works	44
Lima Electric Motor Co.	36
Lincoln Electric Co.	75
Linley Brothers	54
Littell Machine Co., F. J.	327
Logan Engineering Co.	62
Lombard Governor Corp.	274
Lombard Manufacturing Co.	235
Lucas & Son, J. L.	239
Luma Electric Equipment Co.	323

<b>M</b>	
M-B Products Co.	269
McGill Mfg. Co.	292
McKenna Metals Co.	16
Machine Products Corp.	32
Machinery Mfg. Co.	203-301
Madison-Kipp Corp.	262
Majestic Tool & Mfg. Co.	339
Mall Tool Company	58
Marburg Bros.	284
Marshalltown Mfg. Co.	153
Maryland Machine Co.	342
Michigan Tool Co.	86-87
Midwest Abrasive Co.	111
Midwest Tool & Eng. Co.	348
Midwest Tool & Mfg. Co.	64
Miller Co., L. B.	367
Millers Falls Co.	211
Modern Machine Corp.	306
Modern Tools	298
Modern Tool Works	51
Mohr Line-Saw Co.	352
Morrey Machinery Co., Inc.	249-339-348
Moslo Machinery Co.	200
Motor Tool Mfg. Co.	387
Murphy Mch. and Tool Co.	11
Murphy & Co., James A.	315

<b>N</b>	
National Acme Co.	109
New Britain Tool & Mfg. Co.	315
New Method Steel Stamps, Inc.	261
New Plastic Corp.	192
Nichols & Sons, W. H.	171
Nicholson & Co., W. H.	224
Nicholson File Co.	85
Nielsen Engineering Co., John	371
Nielsen, Inc.	352
Nielsen Tool & Die Co.	310
Nilson Machine Co., A. H.	266-267
Nobur Mfg. Co.	314
Norgren Co., C. A.	320
Norton Co.	98-99
Numeral Stamp & Tool Co.	304

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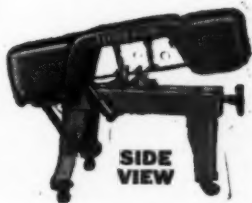
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O'Neil-Irwin Manufacturing Co.	343
Osund Tool & Die Co.	226
Owatonna Tool Co.	139

## P

Paddock Tool Co.	334
Pier Equipment Mfg. Co.	312
Plunkett Machine Co., J. R.	152
Porter-Cable Machine Co.	49
Porter McLeod Machine Tool Co.	27
Fratt & Whitney	65
Precision Tool Co.	350
Prints Electric Co.	350
Procurator Safety Chuck Co.	50
Production Machine Co.	361
Products Machine Co.	84
Products Engineering Co.	182
Progressive Tool & Cutter Co.	321
Progressive Welder Co.	12
Pyrometer Instrument Co.	334

## Q

Queen City Machine Tool Co.	328
-----------------------------	-----

## R

R & L Tools	22
Racine Tool & Mch. Co.	116
Reading Machine Co.	190
Reeves Pulley Co.	133
Remco Products Corp.	293
Richards Co., J. A.	281
Rivett Lathe & Grinder, Inc.	2
Robbins Engrg. Co.	63
Robertson & Co., F. H.	157
Rogers Machine Works	21
Rogers Tool Corp., John M.	330
Rogers & Co., Samuel C.	311
Ross Co., David J.	150
Ross Operating Valve Co.	64-D
Rotary File Co.	230
Rotor Tool Co.	13
Rouse & Co., H. R.	80
Ruthman Machinery Co.	190
Ryerson & Son, Inc., Joe. T.	70

## S

S & S Machine Works	232
Sav-Way Tool & Machining Co.	46
Schauer Machine Co.	303
Scherr Co., George	273
Schmidt, Inc., George T.	341
Schultz & Anderson Co.	37
Scientific Lubricants Co.	335
Seneca Falls Machine Co.	28
Severance Tool Co.	24
Sheldon Machine Co.	259
Simmons Machine Tool Corp.	151
Skillsaw, Inc.	66
Smit & Co., Anton	217
Smith-Johnson Corp.	247
Smith Power Transmission Co.	301
Smith Tool & Eng. Co.	306
Sommer & Adams Co.	143
Sooner Tool & Machine Works	184
South Bend Lathe Works	68
Springfield Machine Tool Co.	93
Stackbin Corporation	347
Standard Electrical Tool Co.	353
Standard Transmission Equip. Co.	306
Star Machine & Engineering Corp.	323
Steege Machinery Co., W. L.	325
Stokerunit Corp.	129

Stow Mfg. Co.	38
Sturdimant Tool Co.	197
Sturtevant Co., P. A.	368
Sundstrand Machine Tool Co.	25
Sunnen Products Co.	212
Super Tool Co.	229

## T

T. & H. Mfg. Co.	180
Tammis Silica Co.	144
Tannevitz Works	245
Tatra Tool Co.	158
Taylor Machine Co.	327
Templeton, Kenly & Co.	364
Thomas Hoist Co.	356
Threadwell Tap & Die Co.	288
Topeka Foundry & Iron Works	307
Torit Mfg. Co.	160
Torq Electric Mfg. Co.	304
Trico Fuse Mfg. Co.	373
Trindl Products, Ltd.	243
Triton Precision Co.	245
Troyke, Alfred A.	353
True-Cut Tool Co.	124-125
Turner Uni-Drive Co.	156
Tuthill Pump Co.	

## U

U. S. Elec. Tool Co.	351
United Precision Products Co.	344
Universal Engineering Co.	220-270
Universal High Speed Tool Co.	332
Upton Electric Furnace Div.	47

## V

Vacuum Cup Metal Pulley Co.	287
Van Norman Machine Tool Co.	14
Victor Machinery Exchange	383
Victor Saw Works	340
Vimeo Manufacturing Co.	338

## W

Wade Tool Company	269
Wagner Electric Corp.	207
Walker-Turner Co.	227
Wall-Colmonoy Corp.	278
Walls Sales Corporation	358
Walton Co.	310
Wardwell Mfg. Co.	309
Welch Industries Inc.	55
Weldex, Inc.	303
Wendt-Sonja Co.	352
Western Tool & Mfg. Co.	105
White Dental Mfg. Co., S. S.	370
Whitney Metal Tool Co.	349
Wiley's Carbide Tool Co.	23
Wilson, K. R.	10
Winter Bros.	276
Wirth & Sons, Carl	40
Witteck Mfg. Co.	55
Wysenbeck & Staff, Inc.	

## Y

Yeomans Tool Co.	236
Yeh Supply Co., Wm. F.	182
Yost Mfg. Co.	305

## Z

Zagar Tool, Inc.	286
Zeh & Hahnemann Co.	333

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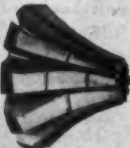
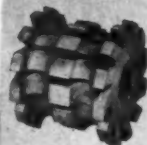


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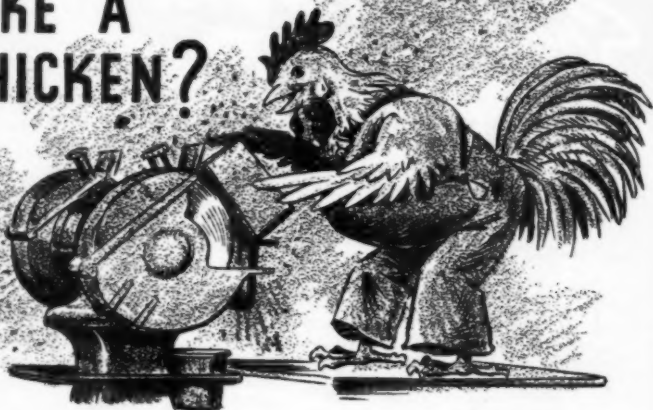
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